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Solid Waste

EPA

Resource Recovery and Waste Reduction Activities

A Nationwide Survey

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Resource Recovery and Waste Reduction Activities

A Nationwide Survey

This publication (SW–432a) was written for EPA's Office of Solid Waste by Bradford J. Max. It replaces EPA's 1977 report on the same subject.

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INTRODUCTION

This report brings together information on the variety of waste reduction and resource recovery programs being carried out in the United States. It is meant to inform municipalities and other interested parties on these programs so that intelligent choices can be made among the alternatives available in solid waste management. The report replaces the 1977 publication entitled *Waste Reduction and Resource Recovery Activities: A Nationwide Survey.*

Eight types of programs are covered in this report in two main categories: waste reduction and resource recovery. The first program, beverage container deposit legislation, is covered under the category of waste reduction activities.

The remaining seven programs fall into the general category of resource recovery. Three of these programs—office paper recycling programs, recycling centers, and separate collection systems—are grouped under the section entitled, "Source Separation Programs." Municipal and Federal resource recovery facilities make up two more programs under the section, "Resource Recovery Facilities."

The recently implemented financial assistance program for resource recovery is described in the section entitled, "Resource Recovery Projects Under the President's Urban Policy."

Finally, State implementation and assistance efforts are described in the section entitled "State Resource Conservation and Recovery Programs."

Some of these eight programs are covered in greater detail than others. For instance, the section on municipal resource recovery facilities gives detailed information on project technology, capacity, status, products, markets, and other characteristics. On the other hand, State resource recovery activities are presented in summary. This approach has been taken because several programs, such as the State activities, are presented in detail in other documents published by the Environmental Protection Agency (EPA).

This survey involved a review of published and unpublished literature and telephone and letter contacts. Dates are given for each program indicating how current the information is. Effort has been made to present the most up-to-date facts available on all programs.

Additional information, questions, or comments on this report should be addressed to the State Programs and Resource Recovery Division (WH-563), Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C. 20460.

Conclusions

A comparison of the information in this survey with that in the 1977 edition (reflecting 1976 data) reveals that activity in resource recovery has increased over the past three years at a fairly steady pace. The estimated percentage of the total post-consumer solid waste stream which has been diverted through resource recovery rose from a little over six percent in 1976 to about 10 percent in 1978.

In the area of municipal resource recovery facilities, growth is quite evident. The 1977 survey identified 19 operating facilities, with a total design capacity of 8200 tons per day (TPD). This report lists 29 operating plants having a total design capacity of over 15,200 TPD, an increase of over 45 percent in total plant capacity. In addition, methane recovery projects increased from a single operating facility in 1977, to three in 1979.

Resource recovery facilities under construction increased from 10 in 1977 to 14 in 1979. Of the 10 facilities under construction in 1977, eight were in operation (or shakedown), as of April 1979.

The 1977 survey lists 33 projects in advanced planning. This survey lists only 22. The reason for this apparent decline is that a much more restrictive definition of "municipal facilities in advanced planning" was used in this survey. Had a comparable definition been used for the same category in this survey, well over 40 projects could have been identified as in advanced planning.

The number of separate collection programs has also increased. The 1977 survey showed 174 separate collection programs in existence in 1974; this update identifies 218 programs as of May 1978. The annual increase in the number of separate collection programs runs about 10 percent, with little attrition.

Explanation of Terms

Abbreviations used in this report are listed in table 1. Two terms that may be explained for

benefit of members of the general public who may not be familiar with the technology are "starved-air, two-chamber furnace," and "fluidized bed incinerator." To define these terms in simplest general concept—

In a *starved-air, two-chamber furnace,* the air supply is limited so that combustible gases given off can be concentrated in a second fire chamber for better control to give more constant and higher temperatures.

In a *fluidized-bed incinerator,* the burning materials are supported by a turbulent bed of coarse sand or other pelletized noncombustible materials that are kept in motion by incoming air draft. The pellets in constant motion (or "flow") transfer heat to the combustibles entering the furnace. The turbulence and transfer of heat help to assure more complete combustion.

TABLE 1. ABBREVIATIONS

A&E	Architect and engineer (procurement)
Al	Aluminum
Bev. cont. legis.	Beverage container legislation
Btu	British thermal unit
Fe	Ferrous metals
ft^3	Cubic feet
MCU	Modular combustion unit
MSW	Municipal solid waste
ND	Not determined
non-Fe	Nonferrous metals
psig	Pounds per square inch gauge
RCRA	Resource Conservation and Recovery Act
RDF	Refuse-derived fuel
RFP	Request for Proposals
RR	Resource recovery
RWI	Refractory wall incinerator
SAT	Saturated steam
$stdft^3$	Standard dry cubic feet
TPD	Tons per day
TPH	Tons per hour
TPY	Tons per year
WWC	Waterwall combustion

WASTE REDUCTION

Waste reduction measures are designed to reduce the amount of solid waste that is generated, thereby reducing collection and disposal costs. When waste reduction incorporates the reuse of products, a decrease in the use of natural resources and in energy consumption results, and lower levels of manufacturing residuals are deposited in air, land, and water mediums.

Virtually the only clearly identifiable waste reduction activities currently in practice are those under seven State beverage container deposit laws.

Comments regarding waste reduction activity should be addressed to Harry Butler, State Programs and Resource Recovery Division (WH-563), Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C. 20460.

Beverage Container Deposit Legislation

The principal characteristics of the beverage container deposit laws are presented in table 2, "Summary of Beverage Container Deposit Legislation."

TABLE 2. SUMMARY OF BEVERAGE CONTAINER DEPOSIT LEGISLATION

State	Connecticut	Delaware	Iowa	Maine	Michigan	Oregon	Vermont
Effective Date	1/8/80	7/1/79*	7/1/79 (5/1/79 for liquor cont.)	1/1/78	12/3/78	10/1/71	9/1/73 (and ended 7/1/75)
Minimum Refund Amount	5¢	5¢	5¢	5¢	10¢/5¢**	5¢/2¢**	5¢
Handling Fee (paid to retailer by distributor)	1¢ or more	–	1¢ max.	1¢ or more	–	–	20% of refund value
Types of Beverages Covered (marked with "x"):							
Ale	–	x	–	x	x	–	–
Beer	x	x	x	x	x	x	x
Malt Beverages	x	x	x	–	x	x	x
Mineral Water	x	x	x	–	x	x	x
Soda Water	x	x	x	x	x	x	–
Soft Drinks	x	x	x	x	x	x	x
Liquor	–	–	x	–	–	–	–
Deposit Begins and Ends at	distributor	distributor	distributor	distributor	distributor	distributor	distributor
Ban on Removable "Tab" Tops?	yes	yes	yes	yes	yes	yes	yes
Container Types Banned	–	–	–	–	–	–	glass non-returnable
Container Types Exempted	–	64 ounce or larger	–	–	–	–	–

* Effective on this date or when Maryland and Pennsylvania pass similar laws, whichever is later.

** Lower amount is for "certified" refillable bottles (bottles that may be used by more than one beverage manufacturer).

RESOURCE RECOVERY

The resource recovery efforts are reported here under the categories of source separation programs, municipal and federal resource recovery facilities, projects under the President's Urban Policy, and State resource conservation and recovery activities.

Source Separation Programs

The source separation technique of resource recovery is accomplished by segregating recyclable waste materials (such as paper, glass, and ferrous and aluminum containers) from other wastes at the point of generation (the home, office, or other place of business) by the waste generator. This separation is followed by transportation of the recyclable materials from their point of generation to a secondary materials dealer or directly to a manufacturer. Transportation may be provided by city collection vehicles, private haulers, scrap dealers, voluntary recycling organizations, or the generator.

The three source separation programs covered in this report are office paper recycling systems, recycling centers, and separate collection systems.

For more information about source separation programs contact State Programs and Resource Recovery Division (WH–563), Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C. 20460.

Office Paper Recycling Programs

Office paper recycling systems collect recyclable high-grade paper. This effort began in banks and insurance companies and has spread to the Federal government through the "Use It Again Sam" program. High-grade paper (for example, white ledger, computer printout paper and index cards) comprises about 50% of the office solid waste stream (up to 80% in some businesses that have significant computer use). Studies have shown that an office paper recycling program can reduce the solid waste stream by 40% and reduce solid waste management costs by 20%.

The "Use It Again Sam" program is very simple in its operation. The employee puts his high-grade paper in a desktop container (a small device the shape and size of a napkin holder), and when that container is full, transfers it to a central collection box. This box is then emptied by building custodians, and the contents are taken to the loading dock for pickup by a paper buyer.

Office paper recycling programs are found all over the country. Over 110 Federal facilities with more than 130,000 employees are participating in the "Use It Again Sam" program. In addition, over 600 private companies have similar programs. A useful guidebook that can be adapted to local and state governmental and private industry programs for paper recycling is EPA's publication SW–571, *Use It Again Sam: A Guide for Federal Office-Paper Recycling.*

Recycling Centers

Recycling centers sprang up throughout the country following Earth Day 1970. Since then they have continued to flourish, although in a very uneven way. Recycling centers are marked more by their diversity than by any other characteristic. They range in size from a sophisticated group like the Portland Recycling Team (PRT) in Portland, Oregon, to small, once-a-month, single-material neighborhood collections.

The Portland Recycling Team collects a large variety of materials for recycling from several collection points throughout the Portland area. While this approach is likely to obtain a larger share of the municipal solid waste stream than the neighborhood recycling center, there are far more neighborhood centers in existence. The small centers are often located in shopping center parking lots and rarely accept more than the three basic recyclables: paper, glass, and metal cans. Recycling centers can be either manned or unmanned. They can be open 24 hours a day or just a few hours a week. Some programs buy back materials (the aluminum company buyback program is the best example of this), but most do not.

Generally, recycling centers have a short life span, since the interest and energy of the volunteers wane. In addition, recycling centers are often marked by high operating costs and low revenues for recyclables due to the small quantities of materials that are reclaimed. There are several thousand recycling centers in America.

For more information on recycling centers, contact Chas Miller, State Programs and Resource Recovery Division (WH–563), Office of Solid Waste, U.S. Environmental Protection

Agency, Washington, D.C. 20460, telephone (202) 755-9140.

Separate Collection Systems

In separate collection programs, residents set aside recyclable materials (e.g. newspaper, glass) from their garbage and place the recyclables at the curb for collection. Within the last ten years, many communities have begun separate collection systems to conserve landfill space, reduce the load on incinerators, and lower overall solid waste management costs. Most of these systems are relatively low in capital costs compared with other recovery methods.

Separate collection has proven to be an effective approach for reducing municipal waste tonnages and generating materials for recycling. The likelihood of resident participation is significantly greater in separate collection programs than in reclamation centers because residents are provided the convenience of having their recyclables collected at their homes. Activities of innovative programs in two communities are described below. The two communities are Marblehead, Massachusetts, and Boca Raton, Florida. The Marblehead program was partially funded through an EPA grant. Following these two brief descriptions, a chart (figure 1) gives locations of separate collection systems and characteristics of those systems, with detailed information on 177 separate collection systems. This information was gathered in a telephone survey conducted by David Cohen of EPA between July and September 1977. Following figure 1 is a list (table 3), of 218 separate collection systems which had been identified by EPA as of May 1978.

Approximately 99 percent of the programs surveyed collected some form of wastepaper (figure 1). In particular, newspaper (old newspaper from residential sources) was collected by 76 percent of the programs, while mixed wastepaper (approximately 80 percent old newspapers and 20 percent unsorted papers, by weight) was collected by approximately 23 percent of the communities. Glass (sorted by color and mixed) was collected by 16 percent of the programs surveyed. Cans and other metals were collected by 13 percent of the programs.

The number of multimaterial separate collection programs, where two or more recyclables are collected, significantly increased from two programs in 1974 to 40 programs in 1978. Of 177 programs surveyed in 1977, approximately 20 percent were conducting multimaterial programs.

Municipal employees were responsible for collecting recyclables in approximately 57 percent of the programs. Collection responsibility was undertaken by private collection firms in 29 percent of the programs and by community organizations in 12 percent.

Approximately 72 percent of all separate collection systems used the "separate truck" collection method. The separate truck approach requires the use of an independent truck and crew to collect recyclables. The "rack" method of separate collection was undertaken by approximately 22 percent of the programs surveyed. The rack method stores recyclables in side, rear, or overhead racks that are usually attached to packer trucks.

A "compartmentalized vehicle" method of separate collection was undertaken in two percent of the communities surveyed. There are two major kinds of compartmentalized vehicles being used in the U.S. One is a separate collection truck which is divided into two or three material compartments. The other is a trailer housing two or three storage bins which is pulled behind a collection truck. Approximately five percent of the communities collected recyclables in trailers that were pulled behind a refuse collection vehicle.

Thirty-nine percent of the separate collection systems had signed contracts to regularly sell materials to a single materials dealer for a specified period of time. A predetermined price and/or a percentage of the market price for a particular recyclable material is always included in the contract. Most contracts signed between municipalities and materials dealers pertained to the sale of separated newspapers.

Many separate collection programs are plagued with scavenger problems. Scavengers are unauthorized persons who pick up recyclable material before the authorized municipal or private collection truck arrives. In response to actual or anticipated scavenger problems, 51 percent of the communities surveyed had enacted anti-scavenging ordinances, prohibiting any unauthorized person or firm from collecting separated material(s).

Most of the separate collection programs surveyed are voluntary, i.e. citizens are "requested" to separate one or more recyclable materials from mixed refuse. However, in attempting to increase participation and waste diversion rates, many communities have adopted ordinances which "mandate" that certain materials be separated from mixed refuse. Approximately 25 percent of the 177 programs surveyed were mandatory.

For additional information about separate collection system implementation, operation, and the national trends, the following EPA publications are recommended.

Residential Paper Recovery: A Municipal Implementation Guide, Penelope Hansen (SW–486)

Source Separation; The Community Awareness Program for Somerville and Marblehead, Massachusetts (SW–551).

A National Survey of Separate Collection Programs, David Cohen (SW–778).

If additional information is needed, contact: State Programs and Resource Recovery Division (WH–563), Office of Solid Waste, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

MARBLEHEAD, MASSACHUSETTS

Separate Collection (Multimaterial)

CAPITAL COST: $40,300

PRODUCTS/MARKET: Paper, all glass and cans/Matcon, Inc.

MAJOR EQUIPMENT MANUFACTURER: Rendispos Corporation

CONSULTANT: Resource Planning Associations, Inc.

STARTUP DATE: January 12, 1976

PROJECT CONTACT: Raymond Reed, Director of Public Health
Adams Hall
Marblehead, Massachusetts 01945
(617) 631-0212

Marblehead is a surburban community in the Boston area with a population of 23,000. In June 1975, the town was awarded a 3-year grant of $78,000 (31% of a $248,000 project) by EPA to implement weekly separate collection of paper, glass, and cans.

The program requires householders to separate recyclables into three categories: (1) paper; (2) glass and cans; (3) mixed brown and green glass and cans. Those three elements are collected by a compartmentalized vehicle each week. Nonrecyclable mixed waste is collected by conventional packer trucks. The material buyer is an intermediate processor who separates the glass from the metals and the aluminum from the ferrous. Revenues received range from $10 to $20 per ton. In addition, Marblehead avoids a landfill charge of $19 for each ton diverted from the landfill. Because no additional labor has been added, program economics are quite favorable. In April 1977, because the recycling program was regularly diverting 25% of the waste stream to recovery, Marblehead eliminated one of its two regular weekly garbage collections. Now the city does garbage collection once weekly and source separation collection once weekly.

EPA will be releasing several additional reports on the Marblehead project.

BOCA RATON, FLORIDA

Separate Collection (Newspaper only)

CAPITAL COST: None, truck rental, $1100/month

PRODUCTS: Newspaper

STARTUP DATE: August 1977

PROJECT CONTACT: Joyce Yelverton
Superintendent of Sanitation
City of Boca Raton
210 West Palmetto Park Road
Boca Raton, Florida 33432
(305) 395-1110

Boca Raton is a coastal city north of Fort Lauderdale. The Sanitation Department serves a population of 58,000 people collecting newspaper from residential units ranging from detached single-family houses to muitistory apartment buildings. In areas using curbside collection, residents place their separated newspapers on the curb, and the newspaper is collected by a crew driving stake-body trucks rented by the city. Apartment residents take their separated newspaper to the garage area and place it in dumpsters. The paper is collected from the dumpsters by city-owned packer trucks.

The Boca Raton program does have high collection costs due to the cost of leasing the trucks and hiring the additional labor that is used in this program. However, revenues have ranged from $22 to $40 per ton of newspaper and the city also saves $11 per ton for every ton diverted from the privately owned landfill that the city uses. As a result, program economics are very favorable.

Nationwide Survey of Separate Collection Programs

The characteristics of the separate collection programs in the nation are summarized in figure 1 and table 3.

Resource Recovery Facilities

Resource recovery facilities are mechanized systems designed and built to recover energy and materials from solid waste. Because these facilities significantly reduce the size of the waste stream by extracting and/or combusting materials, they also serve as a method of extending the useful life of landfills. On account of these benefits, interest in the technology and implementation of resource recovery facilities is growing rapidly.

Information on resource recovery facilities in this survey is divided into a section on municipal facilities and one on Federal facilities. For the latter program, a brief description is provided along with a table summarizing the major activity (table 4).

Municipal Resource Recovery Facilities

Sixty-five communities in the United States are involved with resource recovery facility projects in advanced planning, construction, or operating phases. The three categories of implementation status are identified and defined as follows:

Operating—Plants that are currently accepting solid waste and processing it; plants that have been accepting waste but are temporarily shut down to repair, modify, or expand, or to work out legal, financial, or marketing problems; and plants in the shakedown phase. In addition, these facilities must be doing more than shredding, incineration, ferrous metals recovery, and landfilling; they must have the capability for additional materials or energy recovery. This category does *not* include plants closed permanently.

Under construction—Progress from ground breaking through, but not including, the startup or shakedown phase. Construction at these facilities may be halted, but a date for resuming work must be known.

Advanced planning—To qualify for this category, one of four conditions must be met: a Request for Proposals (RFP) must have been issued for design and construction of the project; construction funding must have been made available; final engineering design must be under way; or, in the case of privately initiated projects, where an RFP will not be a part of the procurement process, either a preliminary design must be complete and must have been accepted by the community involved as a basis for making a go/no-go decision, or a full-service proposal must have been formally offered for disposal services over a multi-year contract period for a predetermined price.

The greatest difficulty with applying this classification system came in separating projects in the "advanced planning" category from those which had not fully completed any of the requirements for that category. The course chosen for borderline cases was to abide strictly by the definitions given above. The result is that the "advanced planning" category does not include some projects for which most implementation groundwork has been laid.

The sixty-five projects in the three implementation categories are summarized in table 4. Following this table are detailed activity reports covering the sixty-five projects. The information contained in these activity reports was gathered through telephone interviews with local officials between January and April 1979.

The Office of Solid Waste at EPA has much published material available to satisfy a wide range of interests concerning resource recovery facilities. The most informative are in the series of booklets entitled, *Resource Recovery Plant Implementation: Guides for Municipal Officials.* The separate publications in this series are titled: *Accounting Format; Financing; Markets; Planning and Overview; Procurement; Risks and Contracts; Technologies;* and *Further Assistance.* Also of great value for its description of current resource recovery technologies is a paper by David Sussman and Steven Levy entitled, *Recovering Energy From Municipal Solid Waste.* To obtain these publications or other information, contact the Resource Recovery Branch, State Programs and Resource Recovery Division (WH-563), Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C. 20460, telephone (202) 755-9140.

Figure 1. Characteristics of Separate Collection Programs

	MATERIALS COLLECTED								RESPONSIBILITY FOR COLLECTION				METHOD OF COLLECTION					CONTRACT FOR MATERIALS	ANTI-SCAVENGER ORDINANCE	MANDATORY ORDINANCE
	Newspaper	Mixed Wastepaper	Glass	Cans	Aluminum	Metal	Other	Municipal	Private	Community Organization	Other	Separate Truck	Rack	Trailer	Compartmentalized Vehicle					
Tucson, AZ	X							X				X				X	X			
Berkeley, CA	X								X			X				X	X			
Davis, CA	X		X	X					X				X							X
Downey, CA	X		X	X					X			X					X			
Fresno and Clovis, CA	X		X	X				X					X				X			
Fullerton, CA	X								X			X				X				
Modesto, CA	X		X	X					X			X				X				
Newport Beach, CA	X							X				X				X	X			
Ontario, CA	X							X				X				X	X			
Pacifica, CA	X								X				X							
Palm Springs, CA	X								X				X			X	X			
Palo Alto, CA	X								X			X					X			
Sacramento County, CA	X							X					X			X	X			
San Anselmo, CA		X			X	X			X			X					X			
San Bernardino, CA	X							X					X			X	X			X
San Diego, CA	X							X				X				X	X			
San Francisco, CA		X							X				X			X	X			
San Luis Obispo, CA	X		X	X					X						X	X				
Santa Barbara, CA	X									X		X								
Santa Maria, CA	X							X					X							
Santa Rosa, CA	X								X				X							
Boulder, CO		X	X						X			X								
Northglenn, CO	X							X					X							

Figure 1 (Continued)

	MATERIALS COLLECTED							RESPONSIBILITY FOR COLLECTION				METHOD OF COLLECTION				CONTRACT FOR MATERIALS	ANTI-SCAVENGER ORDINANCE	MANDATORY ORDINANCE
	Newspaper	Mixed Wastepaper	Glass	Cans	Aluminum	Metal	Other	Municipal	Private	Community Organization	Other	Separate Truck	Rack	Trailer	Compartmentalized Vehicle			
Bloomfield, CT		X							X				X				X	
Durham and Middlefield, CT	X								X			X						
East Hartford, CT	X							X						X				
East Lyme, CT		X	X	X				X				X						X
Enfield, CT	X							X						X		X		
Greenwich, CT		X							X			X					X	
Hartford, CT	X					X		X				X				X	X	
Manchester, CT	X								X					X		X		
Newington, CT	X		X						X							X		
North Haven, CT	X									X		X						
Norwalk, CT		X							X			X					X	X
Rocky Hill, CT	X								X			X						
Stamford, CT		X						X					X			X		X
Waterbury, CT			X	X				X				X				X		
Waterford, CT		X						X						X				X
West Hartford, CT	X							X				X				X		X
Wethersfield, CT	X								X				X			X		
Boca Raton, FL	X							X				X					X	X
Oakland Park, FL	X							X					X				X	
Aurora, IL	X							X				X						
Franklin Park, IL	X									X		X						
Rockford, IL	X								X				X			X	X	
Rolling Meadows, IL	X							X					X					

Figure 1 (Continued)

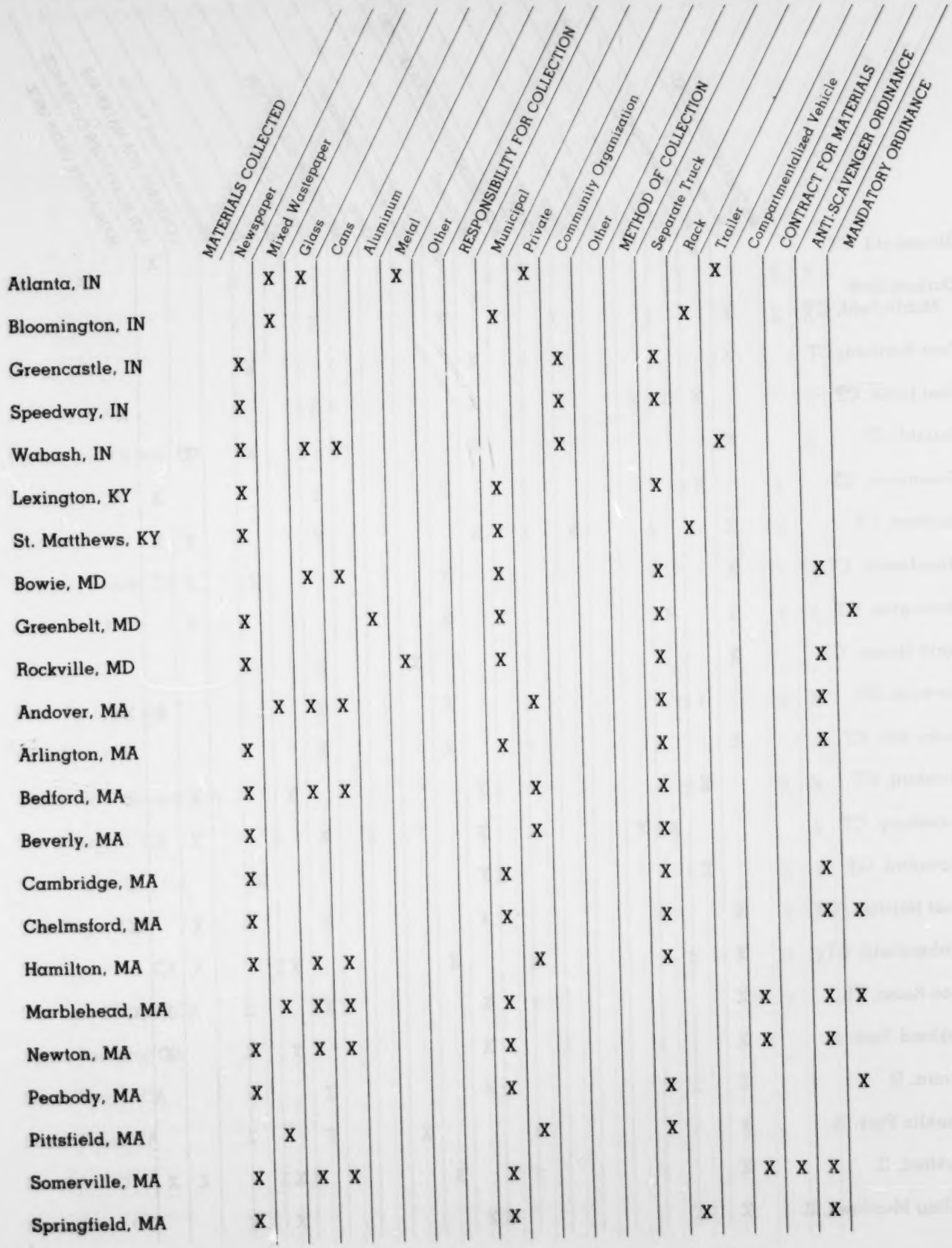
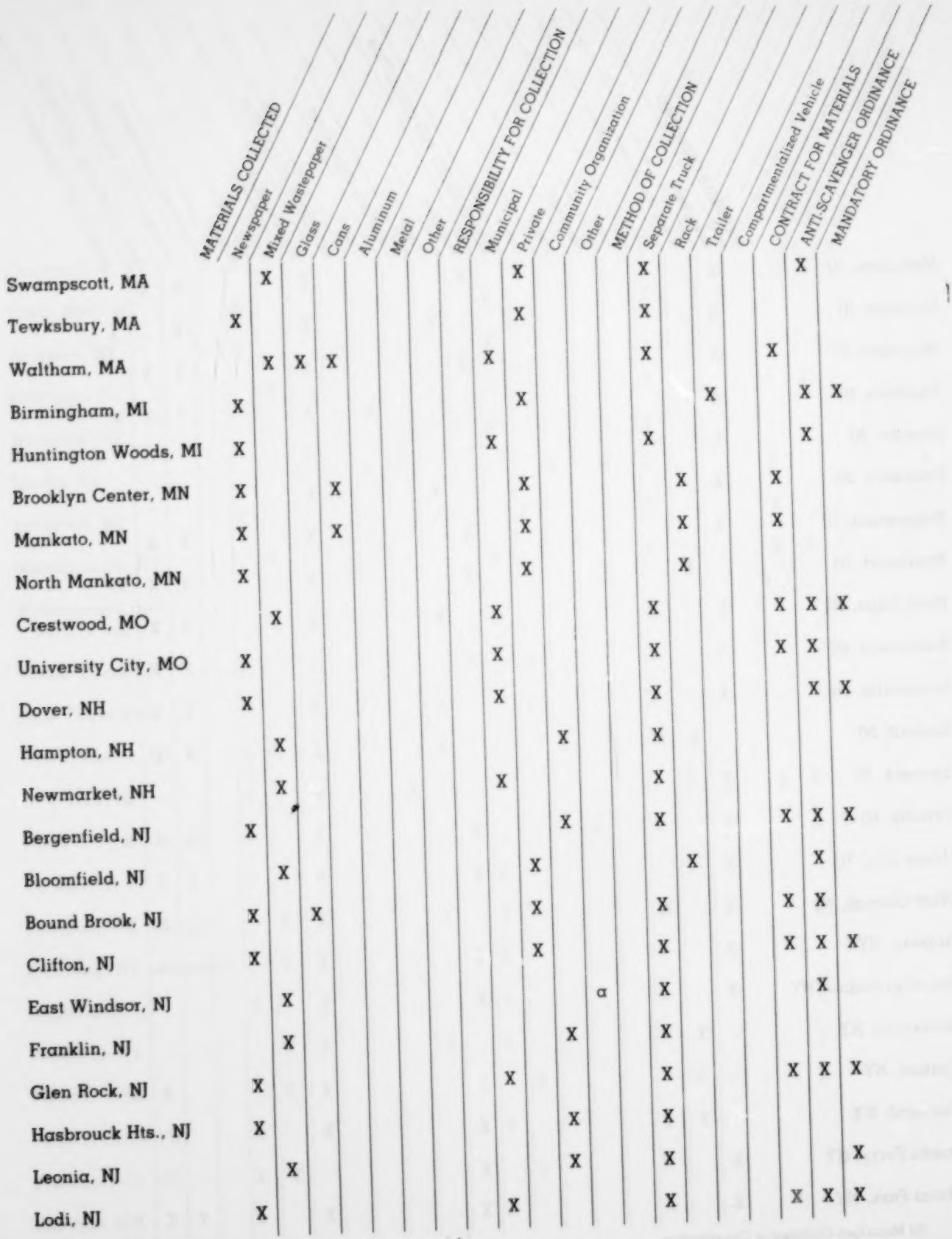


Figure 1 (Continued)



(a) Municipal-Private.

Figure 1 (Continued)

	MATERIALS COLLECTED								RESPONSIBILITY FOR COLLECTION				METHOD OF COLLECTION				CONTRACT FOR MATERIALS	ANTI-SCAVENGER ORDINANCE	MANDATORY ORDINANCE
	Newspaper	Mixed Wastepaper	Glass	Cans	Aluminum	Metal	Other	Municipal	Private	Community Organization	Other	Separate Truck	Rack	Trailer	Compartmentalized Vehicle			
Metuchen, NJ	X							X				X				X	X	
Millburn, NJ	X								X			X				X		X
Montclair, NJ	X							X				X				X	X	
Paramus, NJ	X										b	X				X	X	X
Passaic, NJ	X									X		X						
Princeton, NJ	X								X			X						
Ridgewood, NJ	X							X				X				X	X	
Ringwood, NJ		X						X				X				X	X	X
River Edge, NJ	X								X			X				X	X	X
Rutherford, NJ								X				X				X	X	X
Somerville, NJ	X								X			X				X	X	X
Summit, NJ		X	X						X			X				X	X	
Teaneck, NJ	X									X		X						X
Tenafly, NJ	X							X				X				X	X	X
Union City, NJ	X							X				X				X	X	
West Orange, NJ	X		X						X			X					X	X
Ardsley, NY	X							X				X					X	
Briarcliff Manor, NY	X							X				X						
Bronxville, NY		X							X			X						
Carmel, NY		X						X				X					X	X
Cortland, NY		X						X				X						
Dobbs Ferry, NY	X							X					X					
Floral Park, NY	X							X				X				X	X	X

(b) Municipal-Community Organization.

Figure 1 (Continued)

	MATERIALS COLLECTED							RESPONSIBILITY FOR COLLECTION				METHOD OF COLLECTION				CONTRACT FOR MATERIALS	ANTI-SCAVENGER ORDINANCE	MANDATORY ORDINANCE
	Newspaper	Mixed Wastepaper	Glass	Cans	Aluminum	Metal	Other	Municipal	Private	Community Organization	Other	Separate Truck	Rack	Trailer	Compartmentalized Vehicle			
Garden City, NY	X							X				X				X	X	
Great Neck, NY	X							X				X						
Harrison, NY	X							X				X						
Hastings, NY		X						X				X				X	X	
Irvington, NY		X						X				X						
Ithaca, NY			X		X	X				X		X				X		
Lynbrook, NY	X								X			X				X		
Mamaroneck, NY		X						X				X				X	X	
Mamaroneck and Larchmont, NY		X						X				X						
Mount Kisco, NY	X								X			X						
New Cassel, NY	X								X			X						
New Rochelle, NY	X									X		X						
New York, NY	X							X					X			X	X	
North Hempstead, NY	X										a	X					X	X
Oceanside, NY	X							X					X					
Ossining, NY (village)		X						X				X					X	X
Ossining, NY (township)		X						X				X						X
Oyster Bay, NY	X							X				X					X	X
Peekskill, NY		X						X				X					X	
Pelham, NY		X							X				X				X	
Pelham Manor, NY	X							X				X						X
Pleasantville, NY	X								X			X						
Ramapo, NY	X							X				X						

(a) Municipal-Private.

Figure 1 (Continued)

	MATERIALS COLLECTED							RESPONSIBILITY FOR COLLECTION				METHOD OF COLLECTION				CONTRACT FOR MATERIALS	ANTI-SCAVENGER ORDINANCE	MANDATORY ORDINANCE
	Newspaper	Mixed Wastepaper	Glass	Cans	Aluminum	Metal	Other	Municipal	Private	Community Organization	Other	Separate Truck	Rack	Trailer	Compartmentalized Vehicle			
Rockville Centre, NY		X						X				X				X	X	
Rye, NY		X							X			X				X		
Tarrytown, NY		X						X				X						
White Plains, NY	X							X				X					X	X
Yonkers, NY		X						X				X				X	X	
Glendale, OH		X						X					X					
Indian Hill, OH	X							X				X				X		
Wyoming, OH	X							X					X					
Abington, PA	X		X					X				X					X	X
Allentown, PA	X								X				X			X	X	
Clifton Heights, PA	X		X					X				X						
Darby, PA	X							X				X					X	
Swarthmore, PA		X								X		X					X	
Barrington, RI	X							X				X				X		
Lincoln, RI	X							X				X					X	
Tiverton, RI			X						X			X						
Sioux Falls, SD	X								X			X						
Dallas, TX	X							X				X				X	X	
El Paso, TX	X							X				X				X	X	
Garland, TX	X							X						X				
University Park, TX		X						X				X					X	
Salt Lake City, UT	X							X					X			X	X	
Northfield, VT		X								X		X						

Figure 1 (Concluded)

	MATERIALS COLLECTED								RESPONSIBILITY FOR COLLECTION				METHOD OF COLLECTION					CONTRACT FOR MATERIALS	ANTI-SCAVENGER ORDINANCE	MANDATORY ORDINANCE
	Newspaper	Mixed Wastepaper	Glass	Cans	Aluminum	Metal	Other		Municipal	Private	Community Organization	Other	Separate Truck	Rack	Trailer	Compartmentalized Vehicle				
Alexandria, VA	X								X				X				X	X	X	
Fairfax, VA	X								X				X				X	X		
Falls Church, VA	X								X				X				X		X	
Vienna, VA	X								X				X				X			
Omak, WA		X		X						X			X							
Appleton, WI	X									X			X					X		
Bayside, WI	X								X					X						
Madison, WI	X								X					X			X	X		
Menasha, WI	X									X			X							
Milwaukee, WI	X								X				X				X			
Oshkosh, WI	X								X					X						
Racine, WI	X								X					X				X		
Sheboygan, WI	X								X					X				X		
Shorewood, WI	X								X				X				X	X	X	X
Two Rivers, WI	X									X			X					X		
Whitefish Bay, WI	X								X					X				X	X	

TABLE 3. LIST OF 218 SEPARATE COLLECTION PROGRAMS (MAY 1978)

REGION 1

Connecticut
Bloomfield
Durham and Middlefield
East Hartford
East Lyme
Enfield
Greenwich
Hartford
Manchester
New Hartford
Newington
North Haven
Norwalk
Rocky Hill
Stamford
Waterbury
Waterford
West Hartford
Wethersfield
Winchester Center

Massachusetts
Andover
Bedford
Beverly
Brookline
Cambridge
Chelmsford
Hamilton
Lexington
Marblehead
Newton
North Andover
Peabody
Pittsfield
Salem
Somerville
South Hadley
Springfield
Stoughton
Tewksbury
Topsfield
Waltham

New Hampshire
Hampton
Newmarket

Rhode Island
Barrington
Lincoln
Tiverton

Vermont
Northfield

REGION 2

New Jersey
Bergenfield
Bloomfield
Bound Brook
Clifton
Closter
East Windsor
Fair Haven
Franklin
Glen Rock
Hackensack
Hasbrouck Heights
Leonia
Little Silver
Lodi
Lyndhurst
Metuchen
Millburn
Montclair
Ocean
Palisades Park
Paramus
Passaic
Plainfield
Princeton
Ridgewood
Ringwood
River Edge
Rutherford
Rumson
Shrewsbury
Somerville
Summit
Teaneck
Tenafly
Union City
Upper Saddle River
West Orange
Wharton

New York
Ardsley
Briarcliff Manor
Bronxville
Carmel
Cortland
Dobbs Ferry
Floral Park
Garden City
Great Neck
Harrison
Hastings
Irvington
Ithaca

REGION 2 (Cont.)

Lynbrook
Mamaroneck
Mamaroneck and Larchmont
Mount Kisco
New Cassel
New Rochelle
New York
North Hempstead
North Tarrytown
Oceanside
Ossining
Ossining township
Oyster Bay
Peekskill
Pelham
Pelham Manor
Pleasantville
Ramapo
Rockville Centre
Rye
Tarrytown
White Plains
Yonkers

REGION 3

Maryland
Bowie
Greenbelt
Rockville

Pennsylvania
Abington
Allentown
Clifton Heights
Darby
Swarthmore

Virginia
Alexandria
Fairfax
Falls Church
Vienna

REGION 4

Alabama
Birmingham

Florida
Boca Raton
Oakland Park
South Miami
Temple Terrace

TABLE 3. LIST OF 218 SEPARATE COLLECTION PROGRAMS (Cont.) (MAY 1978)

REGION 4 (Cont.)

Georgia
Macon

Kentucky
Lexington
Saint Matthews

Tennessee
Signal Mountain

REGION 5

Illinois
Aurora
Franklin Park
Rockford
Rolling Meadows

Indiana
Atlanta
Bloomington
Greencastle
Speedway
Wabash

Michigan
Birmingham
Huntington Woods

Minnesota
Brooklyn Center
Columbia Heights
Mankato
North Mankato

Ohio
Glendale
Indian Hill
Wyoming

Wisconsin
Appleton
Bayside
Madison
Menasha
Milwaukee
Oshkosh
Racine
Sheboygan
Shorewood
Two Rivers
Whitefish Bay

REGION 6

Texas
Dallas
El Paso
Garland
University Park

REGION 7

Iowa
Sioux City

Missouri
Crestwood
University City

REGION 8

Colorado
Boulder
Northglenn

Montana
Helena

North Dakota
Fargo

South Dakota
Sioux Falls

Utah
Salt Lake City

REGION 9

Arizona
Tucson

California
Arcata
Atherton
Belmont
Berkeley
Burlingame
Davis
Downey
El Cerrito
Foster City
Fresno, Clovis Metro Area
Fullerton
Half Moon Bay
Hillsborough
Menlo Park
Modesto
Newport Beach
Ontario
Pacifica
Palm Springs
Palo Alto
Redwood City
Sacramento County
San Anselmo
San Bernardino
San Carlos
San Diego
San Francisco
San Luis Obispo
San Mateo
Santa Barbara
Santa Maria
Santa Rosa

REGION 10

Washington
Omak
Seattle

TABLE 4. SUMMARY OF MUNICIPAL RESOURCE RECOVERY FACILITIES

Location	Type*	Design Capacity/ Avg. Throughput, TPD*	Products*	Starting Date
Systems in Operation (29)				
Altoona, Pennsylvania	Composting	25/25	Humus	1963
Ames, Iowa	RDF	400/170	RDF, Fe (Al**)	1975
Azusa, California	Methane	—	Methane	1978
Baltimore, Maryland (temporariiy shut down)	Pyrolysis	1000/temp. shutdown	Steam	1975
Baltimore County, Maryland	RDF	1200/750	RDF, Fe	1976
Blytheville, Arkansas (temporarily shut down)	MCU	50/temp. shutdown	Steam	1975
Braintree, Massachusetts	WWC	384/250	Steam	1971
Chicago, Illinois (Northwest Incinerator)	WWC	1600/1200	Steam (Fe***)	1971
Chicago, Illinois (SW Supp. Fuel) (shakedown)	RDF	1000/500	RDF, Fe	1977
Crossville, Tennessee	MCU	60/65	Steam	1978
East Bridgewater, Massachusetts	RDF	160/varies	RDF	1977
Groveton, New Hampshire	MCU	30/6–11	Steam	1975
Harrisburg, Pennsylvania	Codispoal	720 MSW; 14 sludge/500; ND	Steam	Codisposal 1979
Hempstead, New York (shakedown)	RDF	2000/1300	Electricity (Fe**, Al**, glass**)	1978
Lane County, Oregon (shakedown)	RDF	500/Minimal	RDF, (Fe**)	1979
Madison, Wisconsin (shakedown)	RDF	400/200	RDF, Fe	1979
Milwaukee, Wisconsin (shakedown)	RDF	1200/900	RDF, Fe (Al**, glass aggregate**)	1977
Mountain View, California	Methane	—	Methane	1979
Nashville, Tennessee	WWC	720/400	Steam	1974
New Orleans, Louisiana	Material recovery	750/650	Fe, Al (glass**)	1978
Norfolk, Virginia (U.S. Naval Station)	WWC	360/140	Steam	1967
North Little Rock, Arkansas	MCU	100/90	Steam	1977
Oceanside, New York	WWC	750/750	Steam	1974
Palos Verdes, California	Methane	—	Methane	1975
Pompano Beach, Florida (shakedown)	Codisposal	100 MSW and sludge/10	Methane	1978
Portsmouth, Virginia (Norfolk Naval Shipyard)	WWC	160/30	Steam	1976
Salem, Virginia	MCU	100/70	Steam	1979
Saugus, Massachusetts	WWC	1500/1000	Steam (Fe***)	1976
Siloam Springs, Arkansas	MCU	19/16.5	Steam	1975
Systems Under Construction (14):†				
Akron, Ohio	WWC	1000	Steam, Fe	1979
Albany, New York	RDF	750	RDF, Fe	1980

* Abbreviations are in table 1. Throughput data are not available for facilities under construction or in planning.

** Recovery subsystem in planning, shakedown, or infrequent operation.

*** Material being recovered, but not sold.

† Materials recovery still in planning.

TABLE 4. SUMMARY OF MUNICIPAL RESOURCE RECOVERY FACILITIES (Cont.)

Location	Type*	Design Capacity/ Avg. Throughput, TPD*	Products*	Starting Date
Bridgeport, Connecticut	RDF	1800	RDF, Fe, Al, glass	1979
Dade County, Florida	RDF	3500	RDF, Fe, Al, glass	1981
Duluth, Minnesota	Codisposal	400 MSW, 340 sludge (wet)	Steam, Fe	1979
Genesee Township, Michigan	MCU	100	Steam, electricity	1979
Hampton, Virginia (NASA, USAF)	WWC	200	Steam	1980
Lewisburg, Tennessee	RWI	60	Steam	1979
Los Angeles, California	Methane	—	Methane	1979
Monroe County, New York	RDF	2000	RDF, Fe, Al, glass	1979
Monterey Park, California	Methane	—	Methane	1979
Niagara Falls, New York	RDF	2286	Steam, Fe	1980
Osceola, Arkansas	MCU	50	Steam	1979
Wilmington, Delaware	Codisposal	1000 MSW, 50 sludge	Steam, Fe, Al, glass, humus	1982
Systems in Advanced Planning (22):†				
Appleton, Wisconsin	RDF	2400	Steam, Fe	1982
Auburn, Maine	MCU	150–200	Steam	1980
Beverly, Massachusetts (Bayside Project)	WWC	591	Steam, electricity, Fe	ND
Burlington, Vermont	MCU	200	Steam or hot water	ND
Columbus, Ohio	RDF	1200	Electricity, Fe	1981
Detroit, Michigan	RDF	3000	Steam, electricity, Fe	1983
Dubuque, Iowa	WWC	250	Steam, Fe	1981
Gallatin, Tennessee	WWC	150	Steam, electricity	1981
Glen Cove, New York	Codisposal	225 MSW, 25 sludge	Electricity	1981
Lakeland, Florida	RDF	300	Electricity, Fe	1981
Newark, New Jersey	RDF	2000	RDF, Fe	1981
Norfolk, Virginia (SE Virginia Planning Authority)	RDF	2000	RDF, electricity	1983
North Andover, Massachusetts (NESWC)	WWC	3000	Electricity	ND
Oyster Bay, New York	WWC	ND	ND	1985
Peabody, Massachusetts (SESWC)	RDF	1800	RDF, Fe	ND
Pinellas County, Florida	WWC	2000	Electricity, Fe, non-Fe, aggregate	1982
Pittsfield, Massachusetts	MCU	240	Steam, Fe	1980
St. Paul, Minnesota	WWC	1500	Steam, Fe	1983
Staten Island, New York	Methane	—	Methane	1981
Toledo, Ohio	ND	1000	Steam, Fe	1982
Tulsa, Oklahoma	RDF	1000	RDF, Fe	1982
Westchester County, NY	WWC	1500	Steam	1983

* Abbreviations are in table 1. Throughput data are not available for facilities under construction or in planning.

** Recovery subsystem in planning, shakedown, or infrequent operation.

*** Material being recovered, but not sold.

† Materials recovery still in planning.

AKRON, OHIO*

PROJECT TYPE: Combustion of processed waste in a waterwall furnace to produce steam

DESIGN CAPACITY: 1000 TPD

EXPECTED STARTUP DATE: September 1979

CAPITAL COST: Approximately $48 million (Including construction, engineering fees, financing, and all other costs)

FINANCING: Revenue and general obligation bonds

PROCUREMENT:

Designer—Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

Operator—Teledyne National

Owner—City of Akron

Procurement Approach—A&E

PRODUCTS/MARKETS:

Steam/Business district heating system; The B.F. Goodrich Co.; University of Akron; Akron City Hospital

Ferrous metals/not determined

PROJECT CONTACT: Robert A. Edwards
Service Director
156 South High Street
Akron, Ohio 44308
(216) 375-2270

PROJECT STATUS: Under construction

Construction is approaching completion. The boilers were scheduled to be fired in mid-April 1979.

The City of Akron passed an ordinance which requires that waste collected by private haulers in the city be disposed of at the new facility when it is completed. Private haulers serving the area objected to this restriction and brought suit, to be resolved in May 1979.

ALBANY, NEW YORK

PROJECT TYPE: Processing of waste to produce RDF for use as a primary fuel in off-site production of steam

DESIGN CAPACITY: 750 TPD

EXPECTED STARTUP DATE: June 1980

CAPITAL COST: $11 million for RDF facility; $11 million for steam generator

FINANCING: 50% State bonds, 50% municipal general obligation bonds

*For list of abbreviations used, see Table 1.

PROCUREMENT:

Designer—Smith and Mahoney Consulting Engineers

Operator—Not determined

Owner—City of Albany

Procurement Approach—A&E

PRODUCTS/MARKETS:

RDF (fluff)/New York State Office of General Services

Ferrous metals/not determined

PROJECT CONTACT: Wallace Johnson
Project Manager
Smith and Mahoney
40 Steuben Street
Albany, New York 12207
(518) 463-4107

PROJECT STATUS: Under construction

The city of Albany began taking steps in 1973 to ascertain the feasibility of resource recovery. After evaluating several alternatives, the city selected the processing of waste for use as a primary fuel in steam generation. An attempt was made to employ a simple processing technology, and the design which was adopted includes only shredding and ferrous metals recovery. The plant is being built on the site of one of the city's old landfills. As of February 1979, the concrete foundation for the facility had been laid, the steel frame had been set up, and the shredders were in place.

The RDF will be burned as a primary fuel in two stoker-fired boilers which are being built near downtown Albany by the New York State Office of General Services. The boiler facility will cost approximately $11 million and is expected to be completed by mid-1980. The steam generated will satisfy heating and cooling needs of the Office of General Services.

ALTOONA, PENNSYLVANIA

PROJECT TYPE: Composting of solid waste

CAPACITY:

Design Capacity—25 TPD

Actual Average Throughput—25 TPD

STARTUP DATE: 1963

CAPITAL COSTS: Not available

FINANCING: Private capital

PROCUREMENT:

Designer—Fairfield Engineering Co.

Operator—Fairfield Engineering Co.

Owner—Fairfield Engineering Co.

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Humus (Carrier in lightweight fertilizer)	Vary with customer; granulated, pelletized, etc.	Approx. 8 TPD	Selling	Individuals, nurseries, poultry farm (as li: ter)

PROJECT CONTACT: Daniel Detwiler
Plant Manager
R.D. 1, Box 925
Altoona, Pennsylvania 16601
(814) 942-8938

PROJECT STATUS: Operating

This plant handles all residential solid waste (no oversized bulky waste or commercial waste) which the city collects. The system consists of primary shredding, electromagnetic separation, air classification, secondary shredding, aerobic digestion (5 to 7 days), and final processing to suit customer demand. The plant residuals (15 percent of input) are landfilled. The plant has demonstrated the ability to handle sewage sludge.

AMES, IOWA

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

CAPACITY:

Design Capacity—400 TPD

Actual Average Throughput—170 TPD

STARTUP DATE: September 1975

CAPITAL COSTS: $6.2 million (1974) (Including engineering, construction, miscellaneous equipment, startup, land)

FINANCING: General obligation bonds

PROCUREMENT:

Designer—Gibbs, Hill, Durham & Richardson, Inc.

Operator—City of Ames

Owner—City of Ames

Procurement Approach—A&E

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
RDF	Fluff, 1½ inch	Approx. 135 TPD	Transported pnuematically to city-owned power plant.	
Ferrous metals	Shredded	12 TPD	Selling	Vulcan Materials Co.
Aluminum	Shredded	Minimal	Infrequent operation	Aluminum Company of America (Alcoa)

PROJECT CONTACT: Arnold Chantland
Director, Department of Public Works
City Hall
5th and Kellog Streets
Ames, Iowa 50010
(515) 232-7479

PROJECT STATUS: Operating

The plant at Ames was the first commercial RDF facility to be built. It was patterned after the St. Louis demonstration plant.

The RDF is burned in a city-owned power plant which includes a 33 megawatt suspension-fired boiler and two 20 megawatt spreader-stoker (grate equipped) boilers. The suspension-fired unit, the most efficient of the three, did not provide sufficient retention time for complete combustion of heavy organics, and it was modified in spring 1978 to include burn-out grates at the bottom of the unit. The suspension-fired unit is now being fired using 20 percent RDF, 80 percent coal, without problems. The two spreader-stoker units were routinely operated at up to 50 percent RDF.

The aluminum recovery system has produced minimal amounts of product due to both operating problems and the fact that the feed to the system contains very little aluminum.

Several process modifications to the plant have been required, including dust collection equipment and screening of the RDF. Net costs have averaged over $10 per ton of waste processed. However, the plant has consistently processed Ames' waste and produced RDF which is burned regularly in the city power plant's boilers.

APPLETON, WISCONSIN

PROJECT TYPE: Processing of waste to produce RDF for use as a primary fuel in off-site generation of steam

DESIGN CAPACITY: 2400 TPD (Two 1200-TPD lines)

EXPECTED STARTUP DATE: Late 1982

CAPITAL COSTS: Processing facility—approximately $26 million (Includes costs for entire facility, plus seven transfer stations)
Boiler units—approximately $15 million, total

FINANCING: Revenue bonds

PROCUREMENT:

Designer—Sadoff & Rudoy Industry

Operator—Sadoff & Rudoy Industry

Owner—Not determined

Procurement Approach—Full service

PRODUCTS/MARKETS:

RDF/Midtech Paper Company

Ferrous metals/not determined

PROJECT CONTACT: Wisconsin Solid Waste Recycling Authority
3321 West Beltline Highway
Madison, Wisconsin 53713
(608) 266-2686

PROJECT STATUS: Advanced planning

An RFP for design, construction, and operation of a waste processing facility was issued by the Wisconsin Solid Waste Recycling Authority in 1977. In February 1978, Sadoff & Rudoy was selected as contractor, and negotiations are about 90 percent complete. The Authority is also holding discussions with Midtech Paper Company, for construction of a boiler unit to burn the RDF on the site of Midtech's plant. These talks with Midtech are crucial to further progress of the project.

By State law the Wisconsin Solid Waste Recycling Authority has control of waste in its designated region.

AUBURN, MAINE

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to produce steam

DESIGN CAPACITY: 150 or 200 TPD (3 or 4 modular units)

EXPECTED STARTUP DATE: Late spring 1980

CAPITAL COST: $2.9 million (3 units)

FINANCING: General obligation bonds; Department of Energy, grant for design

PROCUREMENT:

Manufacturer—Consumat Systems, Inc.

Operator—Consumat Systems, Inc. (3-year, renewable agreement)

Owner—City of Auburn

PRODUCTS/MARKETS: Steam/Pioneer Plastics Division of LOF Plastics, Inc.

PROJECT CONTACT: Leo La Rochelle
Engineering Department
45 Spring Street
Auburn City Hall
Auburn, Maine 04210
(207) 784-0145

PROJECT STATUS: Advanced planning

In early 1978 Auburn solicited proposals for a resource recovery system and selected a starved-air, modular incinerator system by Consumat Systems, Inc. Contract negotiations with Consumat were

begun immediately for design, construction, startup, testing, and operation of the facility. Auburn has been awarded a DOE grant covering some, as yet undetermined, portion of the cost of design. Auburn is also considering the implementation of codisposal of sewage sludge with MSW. Full-scale testing of techniques for dewatering, introducing, and burning the sludge in modular incinerators is being carried out by Consumat. Some design modifications will be necessary for codisposal.

Negotiations are presently being carried out with Pioneer Plastics for a steam purchase contract and with local communities for tipping agreements. The outcome of these two series of negotiations will determine whether the city buys 3 or 4 Consumat units. City officials expect the negotiations will be completed by April 1979, and construction will begin during the summer.

AZUSA, CALIFORNIA

PROJECT TYPE: Methane recovery from a landfill

STARTUP DATE: April 1978

CAPITAL COSTS: $1.2 million (Including systems for gas retrieval, cleansing and distribution)

FINANCING: Private capital

PROCUREMENT:

Designer—Azusa Land Reclamation Company; Locman and Associates

Operator—Azusa Land Reclamation Company

Owner—Azusa Land Reclamation Company

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Methane gas	540 Btu/stdft^3	750,000 ft^3/day	Selling	Reichhold Chemical Co.

PROJECT CONTACTS:

Ralph Rule
Azusa Land Reclamation Co.
3055 Wilshire Boulevard
Los Angeles, California 90010
(213) 487-4930

Frank Sheets
Azusa Land Reclamation Co.
1201 W. Gladstone
Azusa, California 91702
(213) 969-1614

PROJECT STATUS: Operating

Methane recovery was begun in Azusa to reduce the threat of damage from migrating landfill gas. Azusa Land Reclamation Company began recovering and flaring the gas in June 1977. By April 1978, the company had begun cleaning and selling the gas to Reichhold Chemical Company for use as a boiler fuel in generating steam. Officials for Azusa Land Reclamation Company claim that the 750,000 cubic feet per day of gas being drawn from the landfill is only a fraction of the amount available. Several additional customers for the gas are located adjacent to the landfill site.

In addition to methane recovery from the completed portion of the landfill, Azusa Reclamation is also carrying out materials recovery in the section of the landfill currently used for disposal. Recovery is accomplished by 25 to 30 people, who handpick materials from piles of waste on the ground. Materials recovered usually include paper, tires, and metal and aluminum cans, but this will vary with the concentration of the materials in the waste stream and with prevailing market prices. Company officials estimate that materials recovery reduces the waste stream 3 to 5 percent by weight.

BALTIMORE, MARYLAND

PROJECT TYPE: Pyrolysis of processed waste to produce steam

CAPACITY:

Design Capacity—1000 TPD

Actual Average Throughput—Temporarily shut down

STARTUP DATE: February 1975

CAPITAL COSTS: $24.8 million (Including recent modifications amounting to about $9 million)

FINANCING: EPA grant, $6 million; State loan, $4 million; City funds, $6 million; Monsanto, $4 million; Economic Development Administration grant, $4.8 million

PROCUREMENT:

Designer—Monsanto Enviro-Chem Systems, Inc.

Operator—City of Baltimore

Owner—City of Baltimore

Procurement Approach—Turnkey

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	415° F, 250 to 300 psig (SAT)	90,000 lb/hr	Temporarily shut down	Baltimore Gas & Electric Company

PROJECT CONTACT: Jacob Bochinski
Assistant Chief of Solid Waste Disposal
1801 Annapolis Road
Baltimore, Maryland 21230
(301) 396-3499

PROJECT STATUS: Operating (temporarily shut down)

This facility was designed and constructed by Monsanto Enviro-Chem Systems, Inc., under a turnkey arrangement for the city of Baltimore, Maryland. However, normal operation has not been possible because of several problems: particulate emissions exceeding standards; mechanical problems with shredded waste storage and kiln feeding; loss of refractory lining in the kiln and afterburner due to slagging and temperature control problems; excessive vibration in the induced draft fan; and failure of the residue drag conveyor.

The emissions problem is being overcome by replacing the low-energy scrubbers with dry, electrostatic precipitators. Most of the other problems have been eliminated or minimized. The city of Baltimore is responsible for the plant modifications, since Monsanto is no longer associated with the project. All modifications were completed in early 1979. City officials expected to resume operation of the plant in May 1979.

The city continued to operate the plant while modifications were under way until early 1978. During the first 8 months of 1977, 60,000 tons of solid waste were processed. From this waste, 225 million pounds of steam were produced and sold to the Baltimore Gas & Electric Company for $680,000.

BALTIMORE COUNTY, MARYLAND

PROJECT TYPE: Processing of waste to recover materials and to produce RDF for use as fuel in off-site generation of steam/electricity

CAPACITY:

Design Capacity—1200 TPD

Actual Average Throughput—750 TPD

STARTUP DATE: January 1976

CAPITAL COSTS: $10 million (1975)

FINANCING: State of Maryland, 50%; Baltimore County, 50%

PROCUREMENT:

Designer—Teledyne National

Operator—Teledyne National

Owner—Maryland Environmental Service (MES)

Procurement Approach—Hybrid (Contract with Teledyne National for operation, but Maryland Environmental Service assumed risk for project)

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
RDF	Varies	200 TPD	RDF produced only for tests; plant normally shreds the waste for landfill.	Test burns; landfill
Ferrous metals	Baled	Approx. 18 TPD	Selling	Bethlehem Steel

PROJECT CONTACT: Robert Pierce
Chief of Operations and Maintenance
Maryland Environmental Services
60 West Street
Annapolis, Maryland 21401
(301) 269-2916

PROJECT STATUS: Operating

This is a demonstration plant funded by Maryland Environmental Services (MES), a State agency. MES contracted with Baltimore County to mutally construct and operate an RDF and materials recovery facility. Teledyne National was selected by MES as the contractor for design, construction, and operation. One-half of the capital cost was provided by the State of Maryland as a reimbursable grant, while the other half was provided by Baltimore County out of its annual capital budget. The county provided the site for the facility and the landfill for disposal of all residuals. The MES will hold title to the facility and be responsible for its operation until the grant has been reimbursed by the county. Teledyne has a contract with MES to operate the facility and is seeking markets for RDF and other products.

The net revenues from sales of RDF and other recovered materials will be shared by the State of Maryland (60 percent), Baltimore County (10 percent) and Teledyne (30 percent, to be reinvested in market and product development) until the State's reimbursable grant has been repaid. After repayment of the grant, Baltimore County will receive 70 percent of the revenues and Teledyne, 30 percent. As of February 1979, most of the RDF was being landfilled. Some RDF has been test burned at various facilities, including local utilities, Wright Patterson Air Force Base, and a cement plant (in cement kilns). Ferrous metal is sold, and glass and aluminum recovery are carried out on an experimental basis.

Plans are being made by Baltimore County to build a boiler unit to generate steam. Preliminary design has been completed for the new facility to be located in eastern Baltimore County. This plant will process waste and burn RDF produced on site and at the currently operating facility.

BEVERLY, MASSACHUSETTS
(Bayside Project)

PROJECT TYPE: Combustion of processed (shredded) waste in a waterwall furnace to produce steam/electricity

DESIGN CAPACITY: 591 TPD

EXPECTED STARTUP DATE: 30 months after authorization to proceed

CAPITAL COST: $18–20 million

FINANCING: Industrial revenue bonds

PROCUREMENT:

Designer—Titan Environmental Services

Operator—Titan Environmental Services

Owner—Industrial Development Financing Authority

Procurement Approach—Full service

PRODUCTS/MARKETS:

Steam and electricity/Beverly Hospital, Massachusetts Electric Co., United Shoe Manufacturing Co.

Ferrous metals/Vulcan Metals Company

PROJECT CONTACT: Richard L. Lewis
Vice President, Engineering and Construction
Titan Environmental Services
East 81, State Highway 4
Paramus, New Jersey 07652
(201) 843-0040

PROJECT STATUS: Advanced planning

This project is one of several which are being considered by communities of northeast Massachusetts. The crucial step for this and all other projects competing in the area is securing commitments to participate from cities and towns. This effort has been delayed, in some cases, by the fact that the towns can authorize such commitments only at "town meetings," which take place once a year.

To assist the communities, EPA Region 1 contracted with a consulting firm to analyze and report on the alternatives available to communities in northeast Massachusetts.

BLYTHEVILLE, ARKANSAS

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to produce steam

CAPACITY:

Design Capacity—50 TPD (4 modular units)

Actual Average Throughput—50–60 TPD

STARTUP DATE: 1975

CAPITAL COSTS: $800,000 (1975)

FINANCING: Municipal bonds

PROCUREMENT:

Manufacturer—Consumat Systems, Inc.

Operator—City of Blytheville

Owner—City of Blytheville

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	—	—	System temporarily shut down	

PROJECT CONTACT: Mayor Tom A. Little
City Hall
Blytheville, Arkansas 72315
(501) 763-3602

PROJECT STATUS: Operational (temporarily shut down)

In 1977 this system was producing and selling up to 24,000 lbs of steam per 10-hour day, 5 days a week. Although a market still exists for steam, none is being produced because of boiler problems. These problems are thought to be the result of overloading and long operation (14 to 16 hours a day) as the supply of waste has outgrown capacity. Consequently, the city is planning to acquire new equipment in the next year to reach a capacity of 75–80 TPD. The new equipment will also have automatic ash removal capability to eliminate serious ash handling problems. The system was meeting state standards for incinerator particulate emissions.

BRAINTREE, MASSACHUSETTS

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam

CAPACITY:

Design Capacity—384 TPD

Actual Average Throughput—250 TPD

STARTUP DATE: 1971

CAPITAL COSTS: $2.5 million (1970)

FINANCING: General obligation bonds

PROCUREMENT:

Designer—Camp Dresser & McKee Inc.

Operator—City of Braintree

Owner—City of Braintree

Procurement Approach—A&E

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	406° F, 250 psig (SAT)	1.44 million lbs/day	Selling half of steam produced	Weymouth Art Leather Company

PROJECT CONTACT: Edward Courchene, Superintendent
Braintree Thermal Waste Reduction Center
Ivory Street
Braintree, Massachusetts 02184
(617) 843-6209

PROJECT STATUS: Operating

In order to meet emissions standards, several modifications were made to equipment between May 1976 and August 1977. This work included changing the flow of gas through the plant and rebuilding the two electrostatic precipitators. The plant met state emissions standards in August 1978.

BRIDGEPORT, CONNECTICUT

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

DESIGN CAPACITY: 1800 TPD

EXPECTED STARTUP DATE: December 1979

CAPITAL COST: $53 million (1975) (Includes construction plus RDF transportation system, site demolition work, utility boiler modifications, capitalized interest, financing, and engineering costs)

FINANCING: Industrial revenue bonds through Connecticut Resources Recovery Authority (CRRA)

PROCUREMENT:

Designer—Combustion Equipment Associates, Inc., and Occidental Resource Recovery Associates (CEA-Oxy)

Operator—CEA-Oxy

Owner—CRRA

Procurement Approach—Full service

PRODUCTS/MARKETS:

RDF (Eco-Fuel II, powdered RDF)/United Illuminating Co.

Ferrous metals/not determined

Glass/Glass Containers Corporation

Aluminum/Reynolds Metals Co.

PROJECT CONTACT: Joseph L. Boren
V.P., Development of Municipal Services
CRRA
60 Washington Street
Suite 1305,
Hartford, Connecticut 06106
(203) 549-6390

PROJECT STATUS: Under construction

On March 31, 1976 CRRA signed a contract (fixed price for capital costs) with a joint venture corporation made up of CEA and Occidental Resource Recovery Associates. The contract covered construction of the entire system including the main processing facility, six transfer stations, facilities for transporting the RDF, and modifications of the utility boilers to burn the RDF. The contract also covered marketing of all recovered products by the joint venture, with a guaranteed minimum revenue for CRRA. Construction was 90 percent complete as of January 1979. CRRA expected six weeks of formal testing to begin in March and full commercial operation to begin by the end of 1979.

The project will process waste from the cities of Darien, Easton, Fairfield, Greenwich, Monroe, Stratford, Trumball, and Westport. These cities have signed an interlocal agreement with CRRA to dispose of their waste at the facility. CRRA, in turn, signed a contract with the joint venture. A total of 1200 TPD has been committed to the project. Negotiations are taking place between CRRA and the towns of Norwalk and Weston for additional waste.

BURLINGTON, VERMONT

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to produce high-temperature hot water or steam

DESIGN CAPACITY: 200 TPD

EXPECTED STARTUP DATE: Not determined

CAPITAL COST: Not determined

FINANCING: General obligation bonds

PROCUREMENT:

Manufacturer—Not determined

Operator—City of Burlington

Owner —City of Burlington

PRODUCTS/MARKETS: High-temperature hot water or steam/University of Vermont

PROJECT CONTACT: Jim Ogden
Supervisor of Streets

P.O. Box 849
Burlington, Vermont 05402
(802) 864-7428

PROJECT STATUS: Advanced planning

The city began investigating resource recovery in 1977 as a means of solving waste disposal and power generation problems. Since that time the power supply problem has been solved, but the waste disposal question remains. Two conceptual studies done for the city have indicated that the use of modular combustion units may be feasible. In February 1979, the city issued an RFP for a formal feasibility study, to be used in making a go/no-go decision on the project. The feasibility study will be due in October 1979. A bond issue has been passed to provide financing should city officials decide to proceed.

CHICAGO, ILLINOIS
(Northwest Incinerator)

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam

CAPACITY:

Design Capacity—1600 TPD (Four 400-TPD boilers)

Actual Average Throughput—1200 TPD

STARTUP DATE: 1971

CAPITAL COSTS: $23 million (1970) (Excluding land)

FINANCING: General obligation bonds

PROCUREMENT:

Designer—Metcalf & Eddy, Inc.

Operator—City of Chicago

Owner—City of Chicago

Procurement Approach—A&E

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	250 psig (SAT)	330,000 lbs/hr	In-house use; contract to sell a portion	Brach Candy Co.
Ferrous metals	Incinerated	Approx. 70 TPD	Landfilling	—

PROJECT CONTACT: Emil Nigro
Supervision Engineer
Department of Streets and Sanitation
Room 704
City Hall
Chicago, Illinois 60602
(312) 744-3181

PROJECT STATUS: Operating

The Chicago Northwest Incinerator was the first waterwall facility in North America to include chute-to-stack components designed by Josef Martin Company (Zurich, Switzerland), and its U.S. licensee, UOP Inc. The facility has four boilers, three of which are fired continuously. The fourth is kept in reserve.

Twenty percent of the steam generated by this facility is used to drive turbines for in-house power. The remaining 80 percent is available for sale. A contract has been signed between the city and Brach Candy Company for purchase of some of the available steam. A steam line is presently under construction.

CHICAGO, ILLINOIS
(Southwest Supplementary Fuel Processing Facility)

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

CAPACITY:

Design Capacity—1000 TPD (Two 1000-TPD lines operating alternately)

Actual Average Throughput—500 TPD

STARTUP DATE: March 1977

CAPITAL COSTS: $16 million (1975) (Excluding land and a $4.5 million RDF handling facility at utility)

FINANCING: General obligation bonds

PROCUREMENT:

Designer—Ralph M. Parsons Company; Consoer, Townsend & Associates

Operator—City of Chicago

Owner—City of Chicago

Procurement Approach—A&E

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
RDF	Fluff	77% of throughput	Selling	Commonwealth Edison Co.
Ferrous metals	Coarsely shredded, less than 6 inches	30 TPD	Selling	REG Associates

PROJECT CONTACT: Emil Nigro
Supervising Engineer
Department of Streets and Sanitation
Room 704
City Hall
Chicago, Illinois 60602
(312) 744-3181

PROJECT STATUS: Operating (shakedown)

This plant produces RDF for Commonwealth Edison Company's Crawford Power Station. The RDF is pneumatically conveyed to the power station. Commonwealth is responsible for operating and maintaining the facilities for receiving, storing, and firing the RDF. The city funded the cost of these facilities and of the boiler modifications.

The RDF plant has two identical, 1000-TPD processing lines which will be operated on alternate days. This arrangement will allow for regular maintenance, excess capacity to cover increases in the waste supply, and redundancy in case of breakdown.

COLUMBUS, OHIO

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in generating steam/electricity

DESIGN CAPACITY: Approximately 1200 TPD received for processing

EXPECTED STARTUP DATE: Waste processing 1974; energy generation, late 1981

CAPITAL COST: $118 million (Entire energy generation and transfer station system, including construction, engineering fees, and interest)

FINANCING: General obligation bonds

PROCUREMENT:

Designer—Alden E. Stilson and Associates

Operator—City of Columbus

Owner—City of Columbus

Procurement Approach—A&E

PRODUCTS/MARKETS:

Electricity/City of Columbus

Ferrous metals/not determined

PROJECT CONTACTS: Bob Parkinson
Director of Public Services
(614) 222-8290
Henry Bell
Electricity Superintendent
(614) 222-8371
City Hall
90 West Broad Street
Columbus, Ohio 43215

PROJECT STATUS: Waste processing, operational; energy generation, advanced planning

In 1974 the city of Columbus began operating three large transfer stations, each equipped with a 60-TPH Jeffrey shredder. Presently, shredded waste from these transfer stations is being landfilled. Plans have been made, and $40 million in equipment has been ordered, for a 90-megawatt power plant in Columbus to burn coal and shredded waste (RDF). A fourth shredding/transfer station will also be constructed on the site of the power plant.

The city of Columbus operates an electricity distribution system which supplies power to 9000 customers and all city streetlights. The city is currently purchasing power to supply this system. When the co-fired power plant begins operation, it will supply electricity to the city's distribution system.

Since the new power plant will be co-fired, changes in burn mixture of RDF and coal can be made to adjust for fluctuations in the supply of waste throughout the year. The city is also considering the feasibility of co-firing sewage sludge with RDF and coal.

The city is responsible for collection of residential waste within the city limits. Officials expect to adjust the tipping fee at the facility to attract private haulers from suburban areas. The loss in revenue from lower tipping fees will be made up by the substantial reduction in landfill disposal costs which the plant will provide for the city.

A legal problem has developed between Columbus and the Ohio Power Siting Commission with regard to the necessity for the co-fired power plant. A case will be heard by the U.S. Supreme Court on this matter, and a decision was expected in early summer 1979.

CROSSVILLE, TENNESSEE

PROJECT TYPE: Combustion of processed waste in a two-chamber, starved-air, modular incinerator to produce steam

CAPACITY:

Design Capacity—60 TPD (Two 30-TPD systems)

Actual Average Throughput—60–70 TPD

STARTUP DATE: May 1978

CAPITAL COSTS: $800,000 (Including the building, equipment, and extensive modifications)

FINANCING: Private capital

PROCUREMENT:

Manufacturer—Environmental Control Products, Inc.

Operator—Environmental Services Corp.

Owner—Environmental Services Corp.

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	135 psig, SAT	15,000 lb/hr	Contract to sell	Crossville Rubber Products

PROJECT CONTRACT: Nelson Walker
President
Environmental Services Corp.
P.O. Box 765
Crossville, Tennessee 38555
(615) 484-7800 or 484-7673

PROJECT STATUS: Operating

Under contract with the city of Crossville, Environmental Services Corporation (ESC) operates the modular combustion system and the city-county landfill for disposal of residue. The system consists of shredding ahead of combustion with automatic ash removal. Extensive equipment modifications have been made to accommodate a waste stream which consists of about one-quarter rubber scrap and an unusually high percentage of glass.

Both gas and oil are used to fire the units, but plant officials claim to have cut fuel use drastically. Incineration begins on Sunday night with ignition of the burners in the lower chamber of the units. These burners remain on, plant officials say, for an average of 18 minutes, or until the temperature in the chamber reaches 800 degrees F. The upper-chamber burners stay on only until the temperature reaches 1200 degrees F, which takes an average of 47 minutes. Then, with overlapping of shifts throughout the week, the units can be operated continuously without additional auxillary fuel consumption. The system also conserves fuel by employing electric ignition, rather than continuously burning pilot lights.

DADE COUNTY, FLORIDA

PROJECT TYPE: Materials recovery using a wet pulping process and production of RDF for use as a supplemental fuel in on-site generation of steam/electricity

DESIGN CAPACITY: 3500 TPD

EXPECTED STARTUP DATE: July 1981

CAPITAL COST: $138 million (not including turbogenerators, costing $20 million)

FINANCING: Florida State Pollution Control Bonds (General obligation)

PROCUREMENT:

Designer—Resources Recovery Dade County, Inc. (RRDC)

Operator—RRDC

Owner—Dade County

Procurement Approach—Full service

PRODUCT/MARKETS:

Steam/Florida Power & Light Company

Ferrous metals/Metal Cleaning and Processing (Milwaukee)

Aluminum/Alcoa

Glass/Owens-Illinois

PROJECT CONTRACT: Thomas Henderson
Chief, Solid Waste Disposal
Dade County Public Works Dept.
909 Southeast 1st Avenue
Miami, Florida 33131
(305) 579-3997

PROJECT STATUS: Under construction

Construction and operation of this facility is being managed by Resources Recovery Dade County, Inc., a subsidiary of Parsons and Whittemore, Inc. The facility will recover materials and produce

RDF using a wet pulping process similar to that used in the Franklin, Ohio, demonstration project. RDF produced at the plant will be burned in four spreader-stoker boiler units. The steam which is produced will be piped to an adjacent facility where it will be used to generate electricity. This generating facility is being constructed and will be operated by Florida Power & Light Company.

Dade County is sharing project risks by agreeing to subsidize RRDC if annual steam revenues fall short of $6.8 million under specific conditions. Any steam revenues over $6.8 million are to be split evenly by Dade County and RRDC. RRDC has the right to all revenues from the sale of recovered materials.

When construction is completed, RRDC is scheduled to receive 60 percent of the cost of construction. Further payment will be made to RRDC in amounts equal to the percentage of design capacity at which the plant is shown to operate while meeting performance requirements.

Ground breaking took place on December 17, 1978. As of March 1979, site preparation was being concluded.

This project was designed on the basis of information gathered at the successful pilot plant at Franklin, Ohio, which was designed and operated by Black Clawson Co., a subsidiary of Parsons & Whittemore Inc. The Franklin plant, an EPA demonstration project, was permanently shut down on March 31, 1979, because it could not be operated economically at the 50-TPD scale on which it was built.

DETROIT, MICHIGAN

PROJECT TYPE: Processing of waste to produce RDF for use as a primary fuel in generating steam (on-site) and electricity (off-site)

DESIGN CAPACITY: 3000 TPD

EXPECTED STARTUP DATE: Early 1983

CAPITAL COST: Not determined

FINANCING: Not determined

PROCUREMENT:

Designer—Combustion Engineering, Inc.

Operator—Joint venture between Combustion Engineering Inc. and Waste Resources Corp.

Owner—Combustion Engineering Inc., or City of Detroit, not determined

Procurement Approach—Full service

PRODUCTS/MARKETS:

Steam/Detroit Edison Company

Electricity/not determined

Ferrous metals/not determined

PROJECT CONTACT: Michael Brinker
Government Analyst
Detroit Environmental Maintenance and Protection Department
Room 513

City-County Building
Detroit, Michigan 48226
(313) 224-3932

PROJECT STATUS: Advanced planning

The city of Detroit issued an RFP for design, construction, and operation of this project in 1976. A joint venture between Combustion Engineering Inc. and Waste Resources Corporation was selected as the full service contractor in June 1977. The parties are currently negotiating to establish the assignment of risk and to work out the details of the financial aspects of the project. Work on the environmental impact statement for the project is also under way.

As presently conceived, the facility will have two processing lines and three boiler units. The processing lines will both be operated for two daily shifts, five days a week. Two of the three boilers will be generating steam continuously, seven days a week. A memorandum of understanding has been signed by the joint venture and Detroit Edison Co. for the sale of steam to be used in Detroit Edison's central steam loop.

No waste supply problems are anticipated since the city of Detroit is responsible for collection. The contracts which the city has with private haulers include provisions that deliveries to transfer agents will stop as soon as the resource recovery facility opens. A sufficient amount of waste is generated in Detroit to operate the facility at planned capacity.

DUBUQUE, IOWA

PROJECT TYPE: Combustion of unprocessed waste in a rotary (waterwall) combustor to produce steam

DESIGN CAPACITY: 250 TPD

EXPECTED STARTUP DATE: May 1981

CAPITAL COST: Approximately $8 million (equipment only); $11 million upper limit on total project

FINANCING: General obligation or revenue bonds

PROCUREMENT:

Designer—Sanders & Thomas, Inc.

Operator—Not determined

Owner—Dubuque Metropolitan Area Solid Waste Agency

Procurement Approach—Turnkey (with Sanders & Thomas, Inc. as construction manager)

PRODUCTS/MARKETS:

Steam/Dubuque Packing Company

Ferrous metals/Local scrap dealer

PROJECT CONTACT: Blake Neville
Project Manager
Sanders & Thomas, Inc.
1720 West End Avenue
Suite 405
Nashville, Tennessee 37203
(615) 320-0642

PROJECT STATUS: Advanced planning

The rotary combustor technology, which is relatively new to U.S. application, was first implemented in Japan. It employs a cylindrical, inclined, rotating "basket" made up of water tubes, running lengthwise along the basket. The tubes are separated by two-inch steel plates which have air intake holes in them. Waste is deposited at the elevated end of the basket, tumbles through with the rotating action and is burned. The residue exits to a quenching tank at the lower end of the basket. Hence, rotation not only conveys the waste, but also agitates it to increase combustion. The rotary combustor system, when combined with a boiler unit, has been shown to have a thermal effeciency of 80 percent. Intended capacity determines the length and diameter of the basket.

The system being planned for Dubuque includes the rotary combustor and ancillary equipment of standard design. Bids were due in April 1979 on the ten major pieces of equipment, which account for 50 percent of the total cost of the project. These bids will be used to determine the final economics of the project, including the tipping fee and the selling price for the steam.

The Dubuque Metropolitan Area Solid Waste Agency is currently responsible for waste collection and expects no problem in directing waste to the facility. The Dubuque Packing Company has agreed to take all steam that the facility produces.

DULUTH, MINNESOTA

PROJECT TYPE: Codisposal—Combustion of processed municipal solid waste and sewage sludge in a fluidized bed incinerator with waste heat recovery to produce steam

DESIGN CAPACITY: 400 TPD of MSW and 340 wet TPD sludge

EXPECTED STARTUP DATE: June 1979

CAPITAL COST: $20 million (Includes all costs for co-incineration facility)

FINANCING: 75% EPA grant, 15% State grant, 10% municipal bonds

PROCUREMENT:

Designer—Consoer, Townsend & Associates

Operator—Western Lake Superior Sanitary District

Owner—Western Lake Superior Sanitary District

Procurement Approach—A&E

PRODUCTS/MARKETS:

Steam/In-house use

Ferrous metals/not determined

PROJECT CONTACT: John Klaers
Manager of Planning
Western Lake Superior Sanitary District
27th Avenue West and The Waterfront
Duluth, Minnesota 55806
(218) 722-3336

PROJECT STATUS: Under construction

This project includes the construction of a facility to process and co-incinerate solid waste with

vacuum filtered sewage sludge. Sewage sludge from a presently operating wastewater treatment plant will be dewatered to 20 percent solids. Municipal solid waste will go through primary shredding, air classification, and secondary shredding. The mixture will be burned in two fluidized bed furnaces. Test burns are scheduled to take place in May 1979, and the facility is expected to begin processing waste in June 1979.

EAST BRIDGEWATER, MASSACHUSETTS

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

CAPACITY:

Design Capacity: 160 TPD

Actual Average Throughput—Not applicable, operation is intermittent

STARTUP DATE: Spring 1977

CAPITAL COSTS: $12 million

FINANCING: Private capital

PROCUREMENT:

Designer—Combustion Equipment Associates, Inc. (CEA)

Operator—CEA

Owner—CEA

Procurement Approach—Not applicable

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
RDF (Eco-Fuel)	Powder, dry, 8–10% ash, 2% moisture, 7500–7800 Btu/lb	Not applicable (Demonstration facility)	Not applicable	Not applicable

PROJECT CONTACT: M.G. Magoulas
V.P., Facilities Management
Combustion Equipment Associates, Inc.
555 Madison Avenue
New York, New York 10022
(212) 980-3700

PROJECT STATUS: Operating

This is a test facility to demonstrate CEA's proprietary process to produce powder RDF. The process is being continually modified to upgrade the RDF quality as experience dictates. RDF from this facility has been fired successfully as a supplement to oil in a steam plant.

GALLATIN, TENNESSEE

PROJECT TYPE: Combustion of unprocessed waste in a rotary (waterwall) combustor to produce steam/electricity

DESIGN CAPACITY: 150 TPD (Two 75-TPD units)

EXPECTED STARTUP DATE: Mid-1981

CAPITAL COST: $7 million, total ($5.8 million for construction, including land, building, and equipment)

FINANCING: Revenue bonds

PROCUREMENT:

Designer—Sanders & Thomas, Inc.

Operator—An Authority to be established by the cities of Gallatin and Hendersonville, and Sumner County, Tennessee

Owner—Authority

Procurement Approach—Turnkey (with Sanders & Thomas as construction manager)

PRODUCTS/MARKETS:

Steam/Donnelly Printing Company; General Fireproofing, Inc.; Andrews Wire, Inc.

Electricity/Tennessee Valley Authority

PROJECT CONTACT: Glenn Swinehart
Vice President
Director of Energy Systems
Sanders & Thomas, Inc.
1720 West End Avenue
Suite 405
Nashville, Tennessee 37203
(615) 320-0642

PROJECT STATUS: Advanced planning

The rotary combustor technology, which is relatively new to U.S. application, was first implemented in Japan. It employs a cylindrical, inclined, rotating "basket" made up of water tubes, running lengthwise along the basket. The tubes are separated by two-inch steel plates which have air intake holes in them. Waste is deposited at the elevated end of the basket, tumbles through with the rotating action and is burned. The residue exits to a quenching tank at the lower end of the basket. Hence, rotation not only conveys the waste, but also agitates it to increase combustion. The rotary combustor system, when combined with a boiler unit, has been shown to have a thermal efficiency of 80 percent. Intended capacity determines the length and diameter of the basket.

The two boiler units will be fired for twelve days every two weeks, with a staggered, two-day shutdown period for each boiler to allow for maintenance and cleanout. When boiler units are operating, the system will generate approximately 45,000 pounds of steam per hour. The steam will be sent through turbogenerators to generate electricity, which will be sold to the Tennessee Valley Authority. This process will reduce the pressure of the steam from about 400 psig to about 200 psig. The 200 psig steam will be sold to local industries.

The system being planned for Gallatin includes the rotary combustor and ancillary equipment of standard design. Bids were due in April 1979, on the major pieces of equipment. These bids will be

used to determine the final economics of the project, including the tipping fee and the selling price for the steam and electricity.

Plans are being made to establish an authority for operating and owning the facility. The authority would be made up of the cities of Gallatin and Hendersonville, and Sumner County. Waste supply for the facility posed a problem for the project, since cities in the county were using various arrangements for waste collections. Twenty-three haulers operate in the county. Consequently, Sumner County enacted a law which brought waste disposal under its control.

GENESEE TOWNSHIP, MICHIGAN

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to produce steam/electricity

DESIGN CAPACITY: 100 TPD (Two 50-TPD units)

EXPECTED STARTUP DATE: June 1979

CAPITAL COST: $2.3 million (Total cost, including co-generation equipment)

FINANCING: Industrial revenue bonds (Michigan State Building Authority Act)

PROCUREMENT:

Manufacturer—Consumat Systems, Inc.

Operator—Not determined

Owner—Genesee Township

PRODUCTS/MARKETS:

Steam/not determined

Electricity/not determined

PROJECT CONTACT: Hanuman Marur
Township Engineer
Charter Township of Genesee
7244 N. Genesee Road
Genesee, Michigan 48437
(313) 640-2000

PROJECT STATUS: Under construction

Construction of this facility is 70 percent complete and startup is scheduled for June 1979. The plant will be located in an industrial park which has both steam and electricity distribution systems. Township officials have added plans for electricity generation to the project, but have not yet found financing for this feature. They are contacting various agencies including the Michigan Energy Administration and the U.S. Department of Energy for possible funding.

The township has a contract with a private hauler for waste collection, transportation, and disposal in a landfill. This contract expires on June 1, 1979. The township is currently taking bids for a new contract which will include collection of waste and transportation to the resource recovery plant.

GLEN COVE, NEW YORK

PROJECT TYPE: Codisposal—Combustion of unprocessed waste and vacuum filtered sewage sludge in a refractory wall furnace with a waste heat boiler to produce steam

DESIGN CAPACITY: 225 TPD of MSW and 25 TPD municipal sewage sludge (20% solids)

EXPECTED STARTUP DATE: Mass burning unit and sewage plant, 1981

CAPITAL COST: Mass burning unit, approximately $8 million; sewage plant, $12 million

FINANCING: Mass burning unit, not determined; sewage plant, city funds with State and Federal grants

PROCUREMENT:

Designer—Joint venture: William F. Cosulich and W. F. Franck

Operator—City of Glen Cove

Owner—City of Glen Cove

Procurement Approach—A&E

PRODUCT/MARKETS: Electricity for use at sewage plant

PROJECT CONTACT: Ernest Pascucci
Commissioner
Department of Public Works
City Hall, Bridge Street
Glen Cove, New York 11542
(516) 676-2000 Ext. 205

PROJECT STATUS: Mass burning unit, advance planning; sewage plant, under construction

This codisposal facility will involve a continuous feed, stoker-fired furnace to burn MSW with sewage sludge which has been vacuum filtered to 20 percent solids. The sludge will be metered into the furnace in such a way that it will remain on top of the bed of refuse during combustion.

The sewage treatment plant has been under construction for a year and a half. Officials for the project expect to solicit bids for construction of the incinerator unit in early summer 1979.

GROVETON, NEW HAMPSHIRE

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to produce steam

CAPACITY:

Design Capacity—24 TPD

Actual Average Throughput—6 to 11 TPD

STARTUP DATE: October 1975

CAPITAL COSTS: $250,000 (1975)

FINANCING: Private capital

PROCUREMENT:

Manufacturer—Environmental Control Products, Inc. (incinerator); Eclipse Boilers (boiler unit)

Operator—Groveton Paper Mill (Diamond International Corporation)

Owner—Groveton Paper Mill, Diamond International Corporation.

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	345° F, 125 psig (SAT)	2000 lbs/hr	Used to satisfy part of in-house steam requirements	

PROJECT CONTACT: Norman Charleston
Superintendent, Steam and Power
Groveton Paper Mill
Groveton, New Hampshire 03582
(603) 636-1154

PROJECT STATUS: Operating

This modular combustion unit is in operation 24 hours a day, six days a week, burning all of the paper mill's waste for five days and all of the city's municipal waste one day. Company officials at the paper mill are primarily concerned with using the unit to dispose of waste, rather than to produce steam. Steam production could be increased by burning more auxilliary fuel with the waste.

HAMPTON, VIRGINIA
(NASA, USAF, Hampton)

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam

DESIGN CAPACITY: 200 TPD (Two 100-TPD boilers)

EXPECTED STARTUP DATE: June 1980

CAPITAL COST: $10 million

FINANCING: Municipal bonds, 70%; USAF and NASA, 30%

PROCUREMENT:

Designer—J. M. Kenith Company

Operator—City of Hampton

Owner—Leased to Hampton by joint venture (National Aeronautics and Space Administration, U.S. Air Force, and Hampton)

Procurement Approach—J. M. Kenith to design, construct, start up, and test for joint venture

PRODUCTS/MARKETS:

Steam/NASA-Langley facilities for heating, cooling, and research needs

PROJECT CONTACT: Leo P. Daspit
Project Manager
NASA-Langley Research Center
Mail Stop 437
Hampton, Virginia 23665
(804) 827-2283

PROJECT STATUS: Under construction

The city of Hampton, NASA and the USAF have combined to form a joint venture for this project. All three parties are contributing funds. The contract for design construction, startup, and testing was signed with J. M. Kenith Co. on January 31, 1978. When the facility is ready for operation, it will be leased by the joint venture to the city of Hampton. It will be operated seven days a week, with 175 TPD of waste from the city and 25 TPD from the Federal installations.

As of February 1979, engineering design was 95 percent complete, and major equipment had been ordered. Construction of the building to house the system was well under way.

HARRISBURG, PENNSYLVANIA

PROJECT TYPE: Codisposal—Combustion of unprocessed municipal solid waste and sewage sludge in a waterwall furnace to produce steam

CAPACITY:

Design Capacity—720 TPD MSW and 14 dry TPD sludge

Actual Average. Throughput—500 TPD MSW; sludge combustion system, under construction

STARTUP DATE: October 1972; sludge combustion system, November 1979

CAPITAL COSTS: $8.3 million (1972) (Not including recent modifications)

FINANCING: Revenue bonds

PROCUREMENT:

Designer—Gannett Fleming Corddry and Carpenter, Inc.

Operator—City of Harrisburg

Owner—City of Harrisburg

Procurement Approach—A&E

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	460° F, 240 psig (SAT)	150,000 lbs/hr	Selling	Pennsylvania Power & Light Company
				In-house use for heating and sludge drying

PROJECT CONTACT: Jack Karper
Deputy Director of Public Works
423 Walnut Street
Harrisburg, Pennsylvania 17101
(717) 255-3118

PROJECT STATUS: MSW incineration, operating; sludge drying and combustion system, under construction

This facility employs chute-to-stack, mass-burning technology supplied by Josef Martin Company (Zurich, Switzerland) and UOP Inc. Modifications have been under way at the plant for over a year to improve steam production, to construct a new steam line, and to provide for drying and combustion

of sewage sludge. The new two-mile steam line was installed to tie the plant into an existing downtown steam loop, which is operated by the Pennsylvania Power & Light Company. This construction was completed, and sales of steam started in late 1978.

A sludge combustion system is presently under construction. Sludge at five percent solids will be pumped to the plant where it will be dewatered in vacuum filters to 20 percent solids and then dried to 10 percent moisture in a steam-heated "porcupine" dryer. The dry sludge will be introduced into the furnace and burned. Some modifications are being made to the waterwall furnace for introducing the dry sludge.

In the past year project officials have made efforts to increase the supply of waste to the facility. Their efforts have included contacting surrounding communities and negotiating with private haulers in Harrisburg. Throughput was approximately 377 TPD in 1977, 485 TPD in 1978, and officials hope it will reach 575 TPD by the end of 1979.

HEMPSTEAD, NEW YORK

PROJECT TYPE: Processing of waste (wet pulping and separation) to produce RDF for use as a primary fuel in on-site generation of steam/electricity

CAPACITY:

Design Capacity—2000 TPD

Actual Average Throughput—1300 TPD, still in shakedown

STARTUP DATE: September 1978

CAPITAL COSTS: $90 million (Not including cost of turbogenerators)

FINANCING: Industrial development revenue bonds and private financing

PROCUREMENT:

Designer—Parsons & Whittemore Inc.

Operator—Hempstead Resource Recovery Corporation (HRRC)

Owner—HRRC

Procurement Approach—Full service

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam/Electricity	—	40 megawatts	Selling	Long Island Lighting Co.
Ferrous metals	—	40,000 TPY (planned)	Contract	Scrap dealer
Aluminum	—	Not determined	Contract	Reynolds Metals Co.; and Aluminum Company of America (Alcoa)
Glass	Color sorted	23,000 TPY (planned)	Contract	Glass Containers Corporation

PROJECT CONTACT: Peter Alevra
P.O. Box 4014
Roosevelt Field Station
Garden City East, New York 11530
(212) 561-8050

PROJECT STATUS: Operating (shakedown)

A contract was signed on December 12, 1974, between the city of Hempstead and Hempstead Resource Recovery Corporation, a subsidiary of Parsons & Whittemore Inc. The contract stipulates that the City will "put or pay" to the recovery system at least 6000 tons of solid waste per week. The contract also requires that the facility be able to process 11,000 tons per week with a maximum of three percent residue by volume.

The facility began operation in September 1978, and as of early 1979 has reached one-half capacity. HRRC officials expect the plant to reach full capacity in May 1979.

This project was designed on the basis of information gathered at the successful pilot plant at Franklin, Ohio, which was designed and operated by Black Clawson Co., a subsidiary of Parsons & Whittemore Inc. The Franklin plant, an EPA demonstration project, was permanently shut down on March 31, 1979, because it could not be operated economically at the 50-TPD scale on which it was built.

LAKELAND, FLORIDA

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in on-site generation of steam/electricity

DESIGN CAPACITY: 300 TPD (One eight-hour shift per day)

EXPECTED STARTUP DATE: October 1981

CAPITAL COST: $186 million (Entire project, including processing and boiler facilities, pollution control equipment, and a small portion of land for the system)

FINANCING: Municipal general obligation bonds

PROCUREMENT:

Designer—C. T. Main, Inc.

Operator—City of Lakeland

Owner—Jointly owned, City of Lakeland and Orlando Utilities Commission

Procurement Approach—A&E

PRODUCTS/MARKETS:

Electricity/Orlando Utilities Commission

Ferrous metals/not determined

PROJECT CONTACT: Claude Hiers
Superintendent of Industrial Engineering and Business Affairs
City of Lakeland
Box 368
Lakeland, Florida 33802
(813) 682-1121

PROJECT STATUS: Advanced planning

This project involves construction of both a waste processing plant and a boiler unit for burning RDF with coal. As of March 1979, the majority of engineering design work had been completed, and the city was making plans to purchase equipment for the facility. Sale of bonds to finance the project was scheduled for mid-March.

The city expects few problems with waste stream control. Over one-half of the population of greater Lakeland lives within the city limits, where waste collection is the responsibility of the city. In addition, the resource recovery facility will lure many private haulers away from landfill disposal because it offers shorter transportation distances.

LANE COUNTY, OREGON

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

CAPACITY:

Design Capacity—500 TPD

Actual Average Throughput—Minimal

STARTUP DATE: Early 1979

CAPITAL COST: $2.1 million (Not including additional work supplied by system contractor)

FINANCING: Municipal general obligation bonds and State grant

PROCUREMENT:

Designer—Allis-Chalmers Corp.

Operator—Western Waste Corp.

Owner—Lane County

Procurement Approach—Turnkey

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
RDF	Less than 2 inches	Not determined	Shakedown	Not determined
Ferrous metals	Shredded	Not determined	Shakedown	Not determined

PROJECT CONTACT: Craig Starr
Director of Solid Waste Management Division
Lane County
125 East 8th Avenue
Eugene, Oregon 97401
(503) 687-4119

PROJECT STATUS: Operating (shakedown)

Construction at this facility is essentially complete, and the shakedown phase has begun. However, several problems have prevented continuous operation. The major problem involves the air classi-

fication system in that the original design using a closed-loop, recirculating-air approach has not been effective. Allis-Chalmers Corp. the turnkey contractor, indicates that the system should be redesigned to vent exhaust air through a bag house. County officials are opposed to this remedy. The facility will not be operated to any significant extent until this problem is resolved.

As of April 1979, no market had been secured for the RDF which the plant is to produce. The University of Oregon at Eugene has expressed some interest in running test burns of the RDF in its boilers.

Waste collection in Lane County is carried out by private haulers. However, because the county owns and operates transfer stations and the landfill, disposal has been the county's responsibility by tradition. Therefore, county officials expect no problems with supplying waste to the facility.

LEWISBURG, TENNESSEE

PROJECT TYPE: Combustion of unprocessed waste in a refractory wall furnace with waste heat boilers to recover steam

DESIGN CAPACITY: 60 TPD (8 to 10 hours of operation per day)

EXPECTED STARTUP DATE: July 1979

CAPITAL COST: $1.75 million (Excluding land)

FINANCING: General obligation bonds

PROCUREMENT:

Designer—CICO Resource Recovery, Inc.

Operator—City of Lewisburg

Owner—City of Lewisburg

Procurement Approach—A&E

PRODUCTS/MARKETS:

Steam/Heil-Quaker Corp.

PROJECT CONTACT: J. L. Moss, Jr.
City Manager
City Administration Building
505 Ellington Parkway
Lewisburg, Tennessee 37091
(615) 359-1544

PROJECT STATUS: Under construction

Construction is nearly complete on this refractory furnace system in Lewisburg. Waste will be burned in suspension in a 20 by 20 foot chamber. Combustion is to be self-sustaining; no auxiliary fuel will be required. Heat will be recovered in a waste heat boiler.

The city of Lewisburg is responsible for waste collection within the city limits. City officials are expecting to attract waste from other communities in the county.

LOS ANGELES, CALIFORNIA

PROJECT TYPE: Methane recovery from a landfill

EXPECTED STARTUP DATE: June 1979, for delivery of gas to city power plant

CAPITAL COST: $1.75 million

FINANCING: Municipal funds

PROCUREMENT:

Designer—City of Los Angeles

Operator—City of Los Angeles

Owner—City of Los Angeles

PRODUCTS/MARKETS:

Methane/Los Angeles, Department of Water and Power

PROJECT CONTACT: John C. Peck
Sanitary Engineering Assistant
Department of Public Works
Room 1410
Los Angeles City Hall East
Los Angeles, California 90012
(213) 485-5347

PROJECT STATUS: Under construction

Equipment to control migration of landfill gas has been in place and operating since 1970 at the Sheldon-Arleta landfill in Los Angeles. Approximately 750 cubic feet per minute of raw landfill gas has been flared. The gas utilization project now under construction will recover 1000 cubic feet per minute of raw gas containing 500 to 550 Btu per standard cubic foot. This gas will be burned in the city-operated power plant, which is two miles from the landfill.

MADISON, WISCONSIN

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

CAPACITY:

Design Capacity—400 TPD

Actual Average Throughput—200 TPD

STARTUP DATE: January 1979

CAPITAL COSTS: $2.4 million (Including construction, engineering, and financing costs; excluding $900,000 for RDF handling facility at utility)

FINANCING: General obligation bonds and municipal capital funds

PROCUREMENT:

Designer—City of Madison

Operator—City of Madison

Owner—City of Madison

Procurement Approach—Not applicable

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
RDF	90% less than ¾ inch	120 TPD	Selling	Madison Gas & Electric Company
Ferrous metals	Coarsely shredded	10 TPD	Selling	Wisconsin Metals and Chemicals Co

PROJECT CONTACT: Gary Boley
Principal Civil Engineer
City-County Building, Room 115
Madison, Wisconsin 53709
(608) 266-4091

PROJECT STATUS: Operating (shakedown)

The city of Madison acted as general contractor for the design and construction of this facility, as well as the RDF handling facility at Madison Gas & Electric Company's power station. Although this placed more risk on the city, it gave the city more control over the project. The processing of waste includes primary shredding, magnetic separation, screening, secondary shredding, and air classification.

Along with operating a resource recovery facility, the city of Madison carries out a strong program in source separation. This program provides for the separate collection of newspaper and results in a waste stream volume reduction of about five percent.

MILWAUKEE, WISCONSIN

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

CAPACITY:

Design Capacity—1200 TPD

Actual Average Throughput—900 TPD

STARTUP DATE: Early 1977

CAPITAL COSTS: Processing facility—$2½ million (1975). (Not including land or $4 million for RDF handling facilities and boiler modifications at power plant)

FINANCING: Private capital

PROCUREMENT:

Designer—American Can Company

Operator—American Can Company

Owner—American Can Company

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
RDF	Fluff; 90% is less than ¾ inch; 5000 Btu/lb	550 to 650 TPD	Selling	Wisconsin Electric Power Co.
Ferrous metal	Shredded	15 TPD	Selling	Wisconsin Metals & Chemicals Co.
Aluminum	Shredded	Not available	Shakedown	Not available
Glass aggregate	Not applicable	Not available	Shakedown	Not available

PROJECT CONTACT: Dr. George Mallan
Director of Operations and Technology
(203) 622-7545
E. J. Greber
Director of Sales and Marketing
(203) 622-7549
Americology, Recovery Systems Division
American Can Company
Greenwich Office Park, No. 8
Greenwich, Connecticut 06830

PROJECT STATUS: Operating (shakedown)

In January 1975, a contract was signed between the city of Milwaukee, American Can Company and Wisconsin Electric Power Company in which the utility agreed to purchase RDF from a facility to be built and operated by the Americology Division of American Can Company. American Can Company's responsibility to operate transfer stations and dispose of Milwaukee's solid waste commenced in January 1976.

After an explosion at the plant on December 28, 1978, American Can Company installed extensive additional safety features, and the plant, in mid-March 1979, is operating. A steel reflector barrier was erected between the shredder enclosure and the picking platform for added protection of picking personnel.

MONROE COUNTY, NEW YORK

PROJECT TYPE: Processing of waste to recover materials and to produce RDF for use as a supplemental fuel in generating steam/electricity

DESIGN CAPACITY: 2000 TPD

EXPECTED STARTUP DATE: June 1979

CAPITAL COST: $53 million (Including professional fees, startup, and RDF receiving facility at utility)

FINANCING: Municipal general obligation bonds and State grant

PROCUREMENT:

Designer—Raytheon Service Company

Operator—Raytheon Service Company (5-year renewable contract)

Owner—Monroe County

Procurement Approach--Modified full service

PRODUCTS/MARKETS:

RDF (fluff, 1½ inch particle size)/Rochester Gas and Electric Corp.

Ferrous metals/Vulcan Metals Company

Aluminum/Reynolds Metals Co.

Glass/not determined

PROJECT CONTACT: Howard F. Christensen
Division of Solid Waste
Department of Public Works
110 Colfax Street
Rochester, New York 14614
(716) 428-5921

PROJECT STATUS: Under construction

Officials for this project are presently attempting to assure a supply of waste to the facility to enable it to operate economically. In addition, RDF marketing work is continuing, in order to assure adequate markets.

Raytheon Service Company designed the facility, is managing construction, and will operate the facility. The facility is being constructed by a general construction contractor selected by the County under a low-bid competition.

As of February 1979, construction of the facility was 90 percent complete, and dry-cycle testing had begun. Officials expect to begin processing materials through the facility by June 1979.

MONTEREY PARK, CALIFORNIA

PROJECT TYPE: Methane recovery from a landfill

EXPECTED STARTUP DATE: July 1979

CAPITAL COST: Not available

FINANCING: Private capital

PROCUREMENT:

Designer—Ortloff Corp.

Operator—Reserve Synthetic Fuels, Inc.

Owner—Joint venture between Ortloff Corp. and Reserve Synthetic Fuels, Inc.

PRODUCTS/MARKETS:

Methane/Southern California Gas Company

PROJECT CONTACT: Fred Rice
Director of Business Development and Marketing
Reserve Synthetic Fuels, Inc.
2750 Signal Parkway
Signal Hill, California 90806
(213) 595-4964

PROJECT STATUS: Under construction

Construction is under way on this project to utilize methane gas from a landfill which is owned and operated by Operating Industries, Inc. Up to about 8 million cubic feet per day of raw gas will be drawn from 21 wells on the site. This gas will be processed to yield approximately 4 million cubic feet of pipeline-quality gas. The processed gas will be piped to an underground storage facility near the landfill and will be used for general distribution by Southern California Gas Company.

MOUNTAIN VIEW, CALIFORNIA

PROJECT TYPE: Methane recovery from a landfill

STARTUP DATE: January 1979

CAPITAL COSTS: $840,000

FINANCING: $270,000, EPA grant; remainder, Pacific Gas & Electric Company (PG&E)

PROCUREMENT:

Designer—PG&E

Operator—PG&E

Owner—PG&E

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Methane	950 Btu/stdft^3	1 million ft^3/day, raw gas; approx. 650,000 ft^3/day, processed gas	Producing	PG&E

PROJECT CONTACTS:

Richard Haughey
Resident Engineer
Dept. of Public Works
540 Castro Street
Mountain View, California 94042
(415) 967-7211

Max Blanchet
Senior Resources Engineer
Pacific Gas & Electric Co.
245 Market Street
San Francisco, California 94106
(415) 781-4211

PROJECT STATUS: Operating

This project became operational in January 1979. Raw gas is pumped from wells on the Mountain View landfill and is purified by a molecular sieve cleansing system. After purification the gas is fed directly into the PG&E transmission pipeline.

NASHVILLE, TENNESSEE

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam

CAPACITY:

Design Capacity—720 TPD (Two 360-TPD boilers)

Actual Average Throughput—400 TPD

STARTUP DATE: June 1974

CAPITAL COSTS: $25 million (Including $13 million for boiler facility and $4 million for steam distribution system in 1974, and $8 million for recent modifications)

FINANCING: Revenue bonds

PROCUREMENT:

Designer—I. C. Thomasson Associates

Operator—Nashville Thermal Transfer Corporation

Owner—Nashville Thermal Transfer Corporation

Procurement Approach—Not applicable

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	600° F, 400 psig	100,000 lb/hr	Selling	Downtown heating and cooling loop

PROJECT CONTACT: Milton Kirkpatrick
General Manager
Nashville Thermal Transfer Corporation
110 First Avenue South
Nashville, Tennessee 37201
(615) 224-3150

PROJECT STATUS: Operating

The Nashville Thermal Transfer Corporation, a nonprofit authority, began operating this facility in June 1974. Unlike other facilities, the system was originally conceived as a fossil-fuel-fired district heating and cooling system. Later, but still in the planning stages, a decision was made to use solid waste as the primary energy source.

The system is operated 24 hours a day, seven days a week. It includes a standby package-type boiler, which can be fired by oil or gas. This is necessary because some of Nashville Thermal's customers have no alternative means of heating or cooling. For cooling, steam turbine-driven chillers provide water at 41° F to customers.

In order to bring the boiler facility into compliance with current emission standards, low-energy scrubbers were recently replaced with electrostatic precipitators. This modification cost approximately $8 million. Particulate emissions are now well within standards.

NEW ORLEANS, LOUISIANA

PROJECT TYPE: Materials recovery using a dry mechanical process (ferrous metals and aluminum) and froth floatation (glass)

CAPACITY: Design Capacity—750 TPD (12 hours a day, 6 days a week)

Actual Average Throughput—650 TPD

STARTUP DATE: March 1978 (Materials recovery processes completed)

CAPITAL COSTS: Approximately $9 million (including buildings and equipment)

FINANCING: Waste Management, Inc. and loan from National Center for Resource Recovery (NCRR)

PROCUREMENT:

Designer—NCRR

Operator—Waste Management, Inc.

Owner—Waste Management, Inc.

Procurement Approach—Full service

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Ferrous metals	Shredded and unshredded	15–20 TPD	Selling	Proler International Corp.
Aluminum	Shredded	500–700 lb/day	Selling	Reynolds Metals Co.
Glass	Froth floated	—	In shakedown	—

PROJECT CONTACTS:

Frank Bernheisel
National Center for Resource Recovery
1211 Connecticut Ave., N.W.
Washington, D.C. 20036
(202) 223-6154

W. S. Parker
Directing Engineer
17000 Chef Menteur Highway
New Orleans, Louisiana 70129
(504) 254-2227

PROJECT STATUS: Operating

This facility is a demonstration project for the National Center for Resource Recovery (NCRR). The operation of the facility has included two phases. The first phase was begun in September 1976, and included waste shredding and landfilling for land reclamation near the site of the plant. A second process line has now been installed which includes trommeling (sizing) of raw waste, shredding, and recovery of ferrous metals, aluminum, and glass. The ferrous metals recovery system is presently being redesigned to improve product quality. NCRR is also actively pursuing an energy market for the light, organic fraction of the shredded waste.

Waste collection is the responsibility of the city of New Orleans. Waste Management, Inc. has a 12-year, "put or pay" contract with the city for delivery of an average 650 TPD of waste to the facility. No shortfalls of waste delivery have taken place. The resource recovery facility processes nearly two-thirds of New Orleans' waste, including nearly all residential solid waste.

NEWARK, NEW JERSEY

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

DESIGN CAPACITY: 2000 TPD initially, 3000 TPD ultimately

EXPECTED STARTUP DATE: 1981

CAPITAL COST: Approximately $70 million

FINANCING: Private capital

PROCUREMENT:

Designer—Joint venture: Combustion Equipment Associates, Inc.; and Occidental Resource Recovery Associates (CEA-Oxy)

Operator—CEA-Oxy

Owner—CEA-Oxy

Procurement Approach—Full service

PRODUCTS/MARKETS:

RDF (powder)/Public Service Electric & Gas Co.

Ferrous metals/Vulcan Metals Co. or M&T Chemicals Inc.

Glass, aluminum, paper possible

PROJECT CONTACT: Frank Sudol
Supervisory Environmental Specialist
Room 410
Newark City Hall
920 Broad Street
Newark, New Jersey 07102
(201) 733-6683

PROJECT STATUS: Advanced planning

A joint venture of Combustion Equipment Associates, Inc., and Occidental Resource Recovery Associates, is financing this project and relying on sales of RDF to Public Service Electric & Gas Co. to make the project profitable. The plant will initially include two 1000-TPD processing lines with facilities for adding a third line. The powdered RDF, "Eco-Fuel II," will be burned by the Public Service Electric & Gas Co. as a supplement to oil.

Since early 1976 activity on this project has moved from pre-bid conference through awarding of a conditional contract and approval by state agencies to issuance of building permits. Ground breaking was scheduled for spring 1979, with construction to be completed 24 months later.

NIAGARA FALLS, NEW YORK

PROJECT TYPE: Processing of waste to recover materials and to produce RDF for use as a primary fuel in on-site generation of steam/electricity

DESIGN CAPACITY: 2286 TPD

EXPECTED STARTUP DATE: April 1, 1980

CAPITAL COST: $73.9 million (Includes all facilities necessary for handling, preparation, and storage of municipal solid waste. Also included are boilers, electrical turbine generators, electrostatic precipitators, and associated auxiliary equipment.)

FINANCING: Niagara County Industrial Development Revenue Bonds

PROCUREMENT:

Designer—Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

Operator—Hooker Chemicals and Plastics Corp.

Owner—Hooker Chemicals and Plastics Corp.

Procurement Approach—Project initiated by Hooker Chemicals and Plastics Corp.

PRODUCTS/MARKETS:

Steam and electricity/Hooker Chemicals and Plastics Corp.

Ferrous metals/not determined

PROJECT CONTACT: James M. Green
Manager—Public Relations
Hooker Chemicals and Plastics Corp.
345 Third Street
Niagara Falls, New York 14302
(716) 278-7007

PROJECT STATUS: Under construction

Approximately 30 percent of construction has been completed, and roughly 70 percent of the capital is committed. Negotiations with local municipalities are under way to secure waste supply contracts.

NORFOLK, VIRGINIA
(Southeastern Public Service Authority)

PROJECT TYPE: Processing of waste to recover materials and to produce RDF for use as a primary fuel in on-site generation of steam/electricity

DESIGN CAPACITY: 2000 TPD

EXPECTED STARTUP DATE: 1983

CAPITAL COST: Approximately $185 million (Including $117 million in construction costs for processing facility and transfer stations; financing costs, engineering fees not included)

FINANCING: Revenue bonds

PROCUREMENT:

Designer—Henningson Durham Richardson, Inc.

Operator—Southeastern Public Service Authority of Virginia (SPSA)

Owner—SPSA

Procurement Approach—A&E

PRODUCTS/MARKETS:

Steam/Norfolk Naval Shipyard, at Portsmouth, Virginia, 100% of steam requirement

Electricity/Naval shipyard, 75% of electricity requirement

PROJECT CONTACT: Durwood Curling
Executive Director
Southeastern Public Service Authority, Suite 127
Koger Center, Building 18
Norfolk, Virginia 23502
(804) 461-0878

PROJECT STATUS: Advanced planning

The Southeastern Public Service Authority of Virginia (SPSA) is made up of the cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach, and the counties of Isle of Wight and Southampton. SPSA is responsible for implementing regional plans in the Southeastern Virginia Planning District. Interest in this resource recovery project began in 1973 with a feasibility study covering waste stream composition, waste collection, and alternative resource recovery technologies. This was followed by the development of an implementation plan in 1976. As of March 1979, SPSA has established a project management team and has selected a site for the project. Engineering design work was 30% complete.

This project is favored by its proximity to the Norfolk Naval Shipyard at Portsmouth, Va. The shipyard is a ready market for the steam and electricity which the plant will generate. The facilities for production of RDF and for power generation will be located on site. The project also includes construction of five solid waste transfer stations.

No significant problems are anticipated in securing waste for the project. Officials for SPSA expect to receive guarantees from the member cities and counties for supplying their waste to the facility. Private haulers, who collect approximately half of the waste in the planning district, are currently supporting the facility. In addition, there are no private landfills in the area.

NORFOLK, VIRGINIA
(U.S. Naval Station)

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam

CAPACITY:

Design Capacity—360 TPD (2 boilers, 180 TPD each, operated alternately)

Actual Average Throughput—140 TPD (1 boiler)

STARTUP DATE: 1967

CAPITAL COSTS: $3.5 million (Including $2.2 million original cost in 1967; plus $1.1 million for electrostatic precipitators in 1976, and $200,000 for retubing in 1978)

FINANCING: Military construction project

PROCUREMENT:

Designer—Metcalf and Eddy, Inc.

Operator—Navy Public Works Center

Owner—U.S. Navy

Procurement Approach—A&E

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	225 psig (SAT)	40,000 lbs/hr	Producing	U.S. Naval Station

PROJECT CONTACT: Causey Simmons
Head, Utilities Department
Navy Public Works Center
Norfolk, Virginia 23511
(804) 444-7775

PROJECT STATUS: Operating

This facility is currently producing 10 percent of the Naval Station's steam requirements. The plant normally operates one unit 24 hours a day, 5 days a week, alternating boilers each week. Twenty percent of the waste burned is residental, the rest is waste from the Naval Station activities.

The plant is undergoing modifications to meet air emissions standards.

NORTH ANDOVER, MASSACHUSETTS
(Northeast Solid Waste Council)

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace for on-site generation of steam/electricity

DESIGN CAPACITY: 3000 TPD

EXPECTED STARTUP DATE: 3 years after signing of contract for construction

CAPITAL COST: $120 million (1978 estimate)

FINANCING: Industrial development revenue bonds

PROCUREMENT:

Designer—UOP Inc.

Operator—UOP Inc.

Owner—UOP Inc.

Procurement Approach—Full service

PRODUCTS/MARKETS:

Electricity/New England Power

PROJECT CONTACT: John F. Albis
Project Manager
Northeast Resource Recovery Project
North Andover Town Hall
North Andover, Massachusetts 01845
(617) 727-1183

PROJECT STATUS: Advanced planning

This facility is the largest of several projects which are being considered by communities of northeast Massachusetts. It has received the endorsement of the Massachusetts Department of Environmental Management. It is designed to handle 3000 TPD, but may be scaled down, depending on the amount

of waste which is committed. As of early February, 1979, less than 1000 TPD had been committed from nearby communities. The project is also designed to include on-site generation of electricity.

The crucial step for this and all other projects competing in the area is securing commitments to participate from cities and towns. This effort has been delayed, in some cases, by the fact that the towns can authorize such commitments only at "town meetings," which take place once a year.

To assist the communities, EPA Region 1 contracted with a consulting firm to analyze and report on the alternatives available to communities in northeast Massachusetts.

NORTH LITTLE ROCK, ARKANSAS

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to prodce steam

CAPACITY:

Design Capacity—100 TPD (4 modular units)

Actual Average Throughput—90 TPD

STARTUP DATE: 1977

CAPITAL COSTS: $1.45 million (Excluding land)

FINANCING: Municipal revenue bonds

PROCUREMENT:

Manufacturer—Consumat Systems, Inc.

Operator—City of North Little Rock

Owner—City of North Little Rock

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	350° F, 130 psig (SAT)	17,000 lbs/hr	Selling 11,750 lbs/hr	Koppers Co., Inc. creosoting plant

PROJECT CONTACT: Jack Atkins
Director of Sanitation
1120 N. Sycamore St.
North Little Rock, Arkansas 72114
(501) 374-6145

PROJECT STATUS: Operating

This facility is operated 24 hours a day, five days a week to supply steam to a nearby creosoting plant. Major maintenance, repair, and residue removal are carried out on the weekends.

The system includes two identical heat recovery modules. Each module is made up of two incinerator units, which feed into a single boiler for heat recovery. The two modules are located on opposite wings of the facility, with a tipping floor between them.

OCEANSIDE, NEW YORK

PROJECT TYPE: Combustion of unprocessed waste in a waterfall furnace for on-site generation of steam/electricity

CAPACITY:

Design Capacity—750 TPD, entire plant (300 TPD in each of two waterfall furnaces, 150 TPD in a backup refractory unit)

Actual Average Throughput—750 TPD

STARTUP DATE: Waterwall furnaces, 1974 and 1976

CAPITAL COSTS: $9 million for both waterwall units

FINANCING: Municipal bonds and state grant (addition of heat recovery system)

PROCUREMENT:

Designer—Charles R. Velzy, Consulting Engineers

Operator—Township of Hempstead, New York

Owner—Township of Hempstead, New York

Procurement Approach—A&E

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	——	60,000 lbs/hr	In-plant use for electricity generation	

PROJECT CONTACT: Al Alvanese
Superintendent, Sanitation
Township of Hempstead
1600 Merrick Road
Merrick, New York 11566
(516) 378-4210

PROJECT STATUS: Operating

This plant originally had three batch-feed, refractory furnaces, two of which had waste heat boilers. The two furnaces with heat recovery were replaced, one in 1974 and the other in 1976, with continuous-feed, waterwall units. The plant has had many problems with corrosion and erosion of boiler tubes. New electrostatic precipitators are meeting emission standards.

OSCEOLA, ARKANSAS

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to produce steam

DESIGN CAPACITY: 50 TPD

EXPECTED STARTUP DATE: Early fall 1979

CAPITAL COST: $750,000 (including building and equipment)

FINANCING: Sanitation revenue bonds

PROCUREMENT:

Manufacturer—Consumat Systems, Inc.

Operator—City of Osceola

Owner—City of Osceola

PRODUCTS/MARKETS:

Steam/Textile finishing firm

PROJECT CONTACT: Mayor R. E. Prewitt
City Hall
Osceola, Arkansas 72370
(501) 563-5245

PROJECT STATUS: Under construction

For several years Osceola has been burning its waste in two 12.5-TPD modular combustion units with no heat recovery. Due to an increasing supply of waste and a secure, adjacent steam market, the city began looking for additional capacity. In September 1978, the city contracted with Consumat Systems, Inc. to trade in its old units and purchase two 25-TPD modular units as part of a system with heat recovery. The system will burn residential and industrial waste. Construction of the building to house the new units is nearly complete.

OYSTER BAY, NEW YORK

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam/electricity (tentative)

DESIGN CAPACITY: Not determined

EXPECTED STARTUP DATE: 1985

CAPITAL COST: Not determined

FINANCING: Not determined

PROCUREMENT:

Designer—Not determined

Operator—Not determined

Owner—Not determined

Procurement Approach—Full service

PRODUCTS/MARKETS:

Steam/not determined

Ferrous metals, aluminum/not determined

PROJECT CONTACT: John Vanderveer
Superintendent of Environmental Control
150 Miller Place
Syosset, New York 11791
(516) 921-7347 Ext. 514

PROJECT STATUS: Advanced planning

RFP has been issued for design, construction, and operation of this project, and proposals were due in June 1979. A pre-submittal conference has been held for all interested parties. Decisions concerning the scale and financing for this project will be made on the basis of a study being finalized in early 1979.

PALOS VERDES, CALIFORNIA

PROJECT TYPE: Methane recovery from a landfill

STARTUP DATE: 1975

CAPITAL COSTS: Not available

FINANCING: Private capital for construction of gas processing plant

PROCUREMENT:

Designer—Reserve Synthetic Fuels, Inc.

Operator—Reserve Synthetic Fuels, Inc.

Owner—Reserve Synthetic Fuels, Inc.

PRODUCTS/MARKETS:

Products	*Characteristics*	Amount Recovered or Produced	*Status*	*Markets*
Methane	Meets pipeline standards, 1000 Btu/stdft^3	1000 ft^3/minute, raw landfill gas; 500 ft^3/minute, processed gas	Selling	Southern California Gas Co.

PROJECT CONTACT: Robert E. Van Heuit
Division Engineer
Los Angeles County Sanitation District
P.O. Box 4998
Whittier, California 90607
(213) 699-7411

PROJECT STATUS: Operating

Reserve Synthetic Fuels, Inc., has constructed and is operating a molecular sieve cleansing plant that purifies raw landfill gas to pipeline standards. Approximately 500 cubic feet per minute of pipeline-quality gas is produced from every 1000 cubic feet per minute of raw gas drawn from wells on the Palos Verdes landfill. The wells and raw gas pipeline system were provided by the Los Angeles County Sanitation District. After purification, the gas is fed directly into a Southern California Gas Company gas main. Plans are being made to expand the facility to process about 3000 cubic feet per minute of raw landfill gas.

PEABODY, MASSACHUSETTS
(Southern Essex Solid Waste Council)

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in the generation of steam/electricity

DESIGN CAPACITY: 1800 TPD

EXPECTED STARTUP DATE: 30–36 months after construction contracts are signed

CAPITAL COST: $20 million

FINANCING: Private capital

PROCUREMENT:

Designer—Combustion Equipment Associates, Inc. (CEA)

Operator—CEA

Owner—CEA

Procurement Approach—Full service

PRODUCTS/MARKETS:

RDF/Narragansett Electric Co. and James River Corporation pulp mill

Ferrous metals/not determined

PROJECT CONTACT: Anthony Fletcher
Chairman, SESWC
1 Salem Green
Salem, Massachusetts 01970
(617) 744-0241

PROJECT STATUS: Advanced planning

This facility is one of several which are being considered by communities in northeast Massachusetts. The project is backed by enabling legislation calling for the Southern Essex Solid Waste District to be created when 275,000 TPY have been committed from communities in the area. The District will have authority to sign contracts for financing, construction, and operation of the facility. As of February 1979, 30,000 TPY had been committed from the city of Peabody.

The crucial step for this and all other projects competing in the area is securing commitments to participate from cities and towns. This effort has been delayed, in some cases, by the fact that towns can authorize such commitments only at "town meetings," which take place once a year.

To assist the communities, EPA Region 1 has contracted with a consulting firm to analyze and report on the alternatives available to communities in northeast Massachusetts.

PINELLAS COUNTY, FLORIDA

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace for on-site generation of steam/electricity.

DESIGN CAPACITY: 2000 TPD, operating seven days per week

EXPECTED STARTUP DATE: Spring 1982

CAPITAL COST: $80–90 million (Total cost, including boiler unit, generators, land, scale house, financing costs, and other costs)

FINANCING: Pinellas County Revenue Bonds

PROCUREMENT:

Designer—Procon Inc., a subsidiary of UOP Inc.

Operator—UOP Inc.

Owner—Pinellas County

Procurement Approach—Full service

PRODUCTS/MARKETS:

Electricity/Orlando Utilities Commission

Ferrous metals, aluminum/not determined

Non-ferrous heavy metals, aggregate/not determined

PROJECT CONTACT: D. F. Acenbrack
Director of Solid Waste Management
Department of Public Works and Utilities
Pinellas County
315 Haven Street
Clearwater, Florida 33516
(813) 448-2251

PROJECT STATUS: Advanced planning

Pinellas County is negotiating with UOP Inc. to finalize contracts for design, construction, and operation of this project. The county is also working on obtaining power plant site certification from the State of Florida.

Electricity will be generated on site and sold to the Orlando Utilities Commission. Plans for the project also include extensive, post-incineration materials recovery of ferrous metals, heavy nonferrous metals, aluminum, and aggregate. This material recovery will be accomplished through specially arranged waste flow and heat control.

Municipal collection systems handle about 60 percent of the 2200 TPD of waste generated in the county. State law gives the county authority over the disposal of waste within its borders. Few problems are expected in obtaining cooperation of the municipalities for the project.

PITTSFIELD, MASSACHUSETTS

PROJECT TYPE: Combustion of processed and unprocessed waste in a two-chamber, starved-air, modular incinerator to produce steam

DESIGN CAPACITY: 240 TPD

EXPECTED STARTUP DATE: Fall 1980

CAPITAL COST: $5.3 million (Construction, processing equipment, combustion units, boilers, steam lines)

FINANCING: Industrial development revenue bonds

PROCUREMENT:

Designer—Vicon Recovery Associates

Operator—Vicon Recovery Associates

Owner—Vicon Recovery Associates

Procurement Approach—Full service

PRODUCTS/MARKETS:

Steam/local paper manufacturer

Ferrous metals, aluminum/not determined

PROJECT CONTACT: Joseph Domas, Jr.
President
Vicon Construction Company
Bridgewater Lane
P.O. Box 488
Lincoln Park, New Jersey 07035
(201) 696-9200

PROJECT STATUS: Advanced planning

After several years of public discussion and study of Pittsfield's solid waste problem, the City Commission decided that resource recovery would provide the best solution. With the assistance of Metcalf & Eddy, Inc. as consultants, the city issued an RFP in the spring of 1978. Vicon Construction Company was selected, and extensive negotiations have been carried out covering construction, financing, markets, and operation. A contract was signed in early February, 1979, between the city and Vicon Recovery Associates, a partnership formed for the purpose of carrying out the contract.

The feasibility of this project was greatly enhanced by the presence of a secure local market for steam. The steam purchaser, a paper manufacturer, has agreed to buy all the steam the facility can produce. Vicon has guaranteed a supply of 600,000 pounds per day and will increase this amount as it is able to do so.

Vicon expects to process one half of the waste burned in the units. Processing will include trommeling and hand sorting to recover ferrous metals and aluminum. However, plant economics are based solely on the production and sale of steam.

POMPANO BEACH, FLORIDA

PROJECT TYPE: Codisposal (pilot) to produce methane in controlled digestors

CAPACITY:

Design Capacity—50 to 100 TPD MSW and sewage sludge

Acutal Average Throughput—10 TPD

STARTUP DATE: June 1978

CAPITAL COSTS: $2.9 million (1976)

FINANCING: U.S. Department of Energy grant

PROCUREMENT:

Designer—Jacobs Construction, Inc.

Operator—Waste Management, Inc.

Owner—Waste Management, Inc.

Procurement Approach—Not applicable

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Methane	550 to 750 Btu/stdft	Not available	Producing	Use on site

PROJECT CONTACT: Peter Ware
Waste Management, Inc.
900 Jorie Boulevard
Oakbrook, Illinois 60521
(312) 654-8800

PROJECT STATUS: Operating (Shakedown)

This pilot facility is operated by Waste Management, Inc., to provide data regarding methane production from a mixture of municipal solid waste and sewage sludge. Optimum temperature, residence time, ingredient mixtures, and supplementary nutrients will be investigated. The process involves shredding, magnetic separation, trommeling, and air classification prior to anaerobic digestion.

PORTSMOUTH, VIRGINIA
(Norfolk Naval Shipyard)

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam

CAPACITY:

Design Capacity—160 TPD (Two 80-TPD boilers)

Actual Average Throughput—30 TPD

STARTUP DATE: 1976

CAPITAL COSTS: Approximately $4.5 million

FINANCING: Military construction project, pollution abatement

PROCUREMENT:

Designer—Not available

Operator—Public Works Department, Norfolk Naval Shipyard, Portsmouth, Virginia

Owner—U.S. Navy

Procurement Appraoch—Not applicable

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	350° F, 125 psig (SAT)	30,000 lbs/hr	Producing	Naval Shipyard

PROJECT CONTACT: Pedro Cananan
NAVFAC ENGCOM
Environmental Quality Branch
Norfolk, Virginia 23511
(804) 444-7313

PROJECT STATUS: Operating

The plant accepts all waste collected from the shipyard and the on-base housing, and is also accepting waste from the city of Norfolk.

The two 80-TPD boilers are operated on alternate weeks to allow for cleanout and maintenance. Steam generated by the plant is supplied to shipyard facilities and ships undergoing repair.

SAINT PAUL, MINNESOTA

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam

DESIGN CAPACITY: 1500 TPD

EXPECTED STARTUP DATE: 1983

CAPITAL COST: Not determined

FINANCING: Not determined

PROCUREMENT:

Designer—Twin RESCO (Joint venture between Wheelabrator-Frye, Inc. and Phoenix Industries)

Operator—Twin RESCO

Owner—Twin RESCO

Procurement Approach—Modified full service

PRODUCTS/MARKETS:

Steam/not determined

Ferrous metals/not determined

PROJECT CONTACT: Floyd Forsburg
Energy and Solid Waste Division
Department of Public Works
234 City Hall
St. Paul, Minnesota 55101
(612) 298-4321

PROJECT STATUS: Advanced planning

RFP was issued in February 1977 which resulted in the selection of Twin RESCO to develop a full service proposal (for design, construction, and operation) for the city of St. Paul. Twin RESCO is a joint venture between Wheelabrator-Frye, Inc., and Phoenix, Inc., a local waste hauling and disposal firm. Twin RESCO began work on securing financing, obtaining required permits, and finalizing contracts for markets and waste supply. The technology to be employed at this facility will be similar to that used at the RESCO plant in Saugus, Massachusetts.

SALEM, VIRGINIA

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to produce steam

CAPACITY:

Design Capacity—100 TPD (Four 25 TPD modular units)

Actual Average Throughput—70 TPD in January 1979

STARTUP DATE: January 1979

CAPITAL COSTS: $1.9 million

FINANCING: Municipal general obligation bonds and a $302,000 Department of Energy grant for energy recovery

PROCUREMENT:

Manufacturer—Consumat Systems, Inc.

Operator—City of Salem

Owner—City of Salem

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	250 psig (SAT)	20,000 lbs/hr	Selling	Mohawk Rubber Company

PROJECT CONTACT: William Paxton
City Manager
P.O. Box 869
Salem, Virginia 24153
(703) 389-8601

PROJECT STATUS: Operating

Two relatively minor problems surfaced in the first month and a half of operation in the system's automatic ash removal equipment. The first problem was the freezing of water in the system's residue quenching tank. This will be alleviated by modifying and heating the building. The second problem involves the conveyor which moves residue from the incinerators to the quenching tanks. A single conveyor performs this function for all four modular units. Large, irregular-sized pieces of metal were found to block the flow of the conveyor. Officials recommend that systems be designed with more than one conveyor to service four units.

The system is operated 24 hours a day, five days a week. Nine people are assigned to the project, including: a supervisor, a clerk for weighing trucks and bins, a mechanic, and two people on three shifts to charge and operate the units.

SAUGUS, MASSACHUSETTS

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam

CAPACITY:

Design Capacity—1500 TPD

Actual Average Throughput—1000 TPD

STARTUP DATE: 1976

CAPITAL COSTS: $43 million

FINANCING: Industrial revenue bonds and private capital

PROCUREMENT:

Designer—Refuse Energy Systems Company (RESCO), a joint venture between Wheelabrator-Frye, Inc. and De Matteo Construction Company

Operator—RESCO

Owner—RESCO

Procurement Approach—Not applicable

PRODUCTS/MARKETS:

Products	*Characteristics*	*Amount Recovered or Produced*	*Status*	*Markets*
Steam	Superheated, 845° F	285,000 lbs/hr	Selling	General Electric Co.
Ferrous metals	—	75 to 80 TPD	Stockpiling	—

PROJECT CONTACT: John Kehoe
Vice President
General Manager, Energy Systems Division
Wheelabrator-Frye, Incorporated
Hampton, New Hampshire 03842
(800) 258-0850

PROJECT STATUS: Operating

The plant had superheater and grate problems which have been solved by using special alloys. It has not been operated at full capacity as yet because the amount of waste delivered to the plant has been less than anticipated. General Electric Co. does nct always take the full load of steam which the plant produces.

SILOAM SPRINGS, ARKANSAS

PROJECT TYPE: Combustion of unprocessed waste in a two-chamber, starved-air, modular incinerator to produce steam

CAPACITY:

Design—19 TPD (Two 9.5 TPD modular units)

Actual Average Throughput—16.5 TPD

STARTUP DATE: September 1975

CAPITAL COSTS: $377,000 (1974)

FINANCING: Municipal funds

PROCUREMENT:

Manufacturer—Consumat Systems, Inc.

Operator—City of Siloam Springs

Owner—City of Siloam Springs

PRODUCTS/MARKETS:

Products	Characteristics	Amount Recovered or Produced	Status	Markets
Steam	125 psig (SAT)	10,000 lbs/hr	Selling	Local food canning plant

PROJECT CONTACT: Al Varwig
Superintendent of Sanitation
City Hall
Siloam Springs, Arkansas 72761
(501) 524-8512

PROJECT STATUS: Operating

This facility has been successfully burning municipal solid waste and producing steam since September 1975. Volume and weight reduction are 95 percent and 67 percent, respectively.

The entire operation is broken into three operating steps per 24-hour period: 15 hours of charging and burning solid waste, 7 hours of cooldown and 2 hours of cleanout. Plant operators indicate a problem with cracking of refractory material inside furnaces during ash cleanout when cold outside air comes in contact with the refractory walls. The city is considering purchase of an automatic ash removal system to alleviate this problem.

STATEN ISLAND, NEW YORK

PROJECT TYPE: Methane recovery from a landfill

EXPECTED STARTUP DATE: 1981

CAPITAL COST: Not available

FINANCING: Private capital

PROCUREMENT:

Designer—Not determined

Operator—Reserve Synthetic Fuels, Inc.

Owner—Reserve Synthetic Fuels, Inc.

PRODUCTS/MARKETS:

Methane/Brooklyn Union Gas Company

PROJECT CONTACT: Fred Rice
Director of Business Development and Marketing
Reserve Synthetic Fuels, Inc.
2750 Signal Parkway
Signal Hill, California 90806
(213) 595-4964

PROJECT STATUS: Advanced planning

This project will be located at the New York City Fresh Kills* Landfill on Staten Island. It will produce 4 to 6 million cubic feet of pipeline-quality gas per day. Final engineering design is under way.

* "Kill" or "kil" was early Dutch settlers' term for "channel" or "creek."

TOLEDO, OHIO

PROJECT TYPE: Combustion of unprocessed waste or processing of waste to produce RDF (not determined)

DESIGN CAPACITY: 1000 TPD

EXPECTED STARTUP DATE: Late 1982

CAPITAL COST: Approximately $46 million

FINANCING: Ohio Water Development Authority Bonds (tentatively)

PROCUREMENT:

Designer—Not determined

Operator—Not determined

Owner—Ohio Water Development Authority

Procurement Approach—Full service

PRODUCTS/MARKETS:

Steam/Local industrial user

Ferrous metals/not determined

PROJECT CONTACT: Gary V. Hodge
Deputy Director
Toledo Metropolitan Area Council of Governments
Robert C. Rivet
Resource Economist
420 Madison Avenue
Toledo, Ohio 43604
(419) 241-9155

PROJECT STATUS: Advanced planning

RFP for design, construction, and operation of this facility was issued in October 1978. Seventeen responses were received. Proposals are for steam production and for generation of steam and electricity. Selection of a contractor was planned for June 1979.

The Toledo Metropolitan Area COG is the designated solid waste planning agency for the Toledo area. The implementing entity for resource recovery in the Toledo area is Northwestern Ohio Solid Waste Management (NOSWM). The NOSWM Board of Trustees is recognized by the local governments and state agencies as the policy-making body for resource recovery project development and implementation in the Toledo area. The eight-member Board of Trustees of NOSWM is appointed by the Mayor of Toledo (5 members), the Lucas County Commissioners (2), and the Toledo Chamber of Commerce (1). The Toledo Metropolitan Area COG is represented on the board in non-voting capacity.

TULSA, OKLAHOMA

PROJECT TYPE: Processing of waste to produce RDF for use as a supplemental fuel in off-site generation of steam/electricity

DESIGN CAPACITY: 1000 TPD

EXPECTED STARTUP DATE: Early 1982

CAPITAL COST: $22 million (construction costs)

FINANCING: Industrial revenue bonds

PROCUREMENT:

Designer—Mustang RDF Company and Williams Brothers Engineering Co.

Operator—Mustang RDF Company

Owner—Tulsa Energy Resource Recovery Authority (TERRA)

Procurement Approach—Full service

PRODUCTS/MARKETS:

RDF (fluff, 1" nominal size)/Public Service Co. of Oklahoma

Ferrous metals, Aluminum, mixed non-ferrous, glass/not determined

PROJECT CONTACT: David Thomas
V.P., General Manager
Mustang RDF Company, Suite 1100
First National Center East
120 North Robinson St.
Oklahoma City, Oklahoma 73102
(405) 272-9471

PROJECT STATUS: Advanced planning

Interest in resource recovery in Tulsa began in 1975 with discussions between the City Commission, Public Service Company of Oklahoma (electric utility), and Williams Brothers Urban Ore, Inc., an environmental engineering firm. In November 1977, the Tulsa Energy Resource Recovery Authority (TERRA) was created by the City Commission to finance, construct, and own a resource recovery facility. Since then, Williams Brothers and Mustang RDF Company, a subsidiary of Mustang Fuel Corporation, have financed feasibility studies for the project and are presently completing work on engineering design. The only condition the two companies have made for sponsoring this work is that they be reimbursed from bond proceeds if TERRA uses the engineering data they developed to build the system.

One problem which has been encountered is that of securing waste for the facility. Municipal collection in Tulsa accounts for less than 50 percent of the waste. One-hundred-and-thirty private haulers operate outside direct city control.

WESTCHESTER COUNTY, NEW YORK

PROJECT TYPE: Combustion of unprocessed waste in a waterwall furnace to produce steam/electricity

DESIGN CAPACITY: 1500 TPD

EXPECTED STARTUP DATE: Early 1983

CAPITAL COST: $75–80 million

FINANCING: $27 million from New York Environmental Quality Bonds; 20% of total from private equity; remainder from industrial development revenue bonds

PROCUREMENT:

Designer—Not determined

Operator—Not determined

Owner—Joint ownership: private contractor to be selected and municipal authority to be established

Procurement Approach—Modified full service

PRODUCTS/MARKETS:

Steam/not determined

PROJECT CONTACT: Edward Davies
Assistant Commissioner
Solid Waste
522 County Office Building
White Plains, New York 10601
(914) 682-2003

PROJECT STATUS: Advanced Planning

In 1977, officials issued RFP's for resource recovery facilities at two sites in the county. The 14 responses were analyzed, and a report was sent to the County Board of Legislators. The Board eventually rejected both original sites for the facility and selected a third at Peekskill, New York. Then, based on the responses to the original RFP's, county officials began drafting bid documents for the Peekskill facility. The bid documents will be used to select a construction contractor through competitive bidding, as required by New York State procurement law.

Since the county does not have control of the waste stream, county officials are developing inter-municipal agreements with up to 44 communities in the county for participation in the project. The county has been divided into eight waste-shed areas to facilitate transportation of the waste.

WILMINGTON, DELAWARE

PROJECT TYPE: Codisposal—Combustion of municipal solid waste and sewage sludge in a waterwall furnace to produce steam

DESIGN CAPACITY: 1000 TPD MSW and 50 dry TPD sludge

EXPECTED STARTUP DATE: 1982

CAPITAL COST: Projected, $75-90 million

FINANCING: Revenue bonds, federal and state grants

PROCUREMENT:

Designer—Processing facility, Raytheon Service Company; steam generating facility, not determined; sludge handling subsystem, Raytheon Service Company

Operator—Processing facility, Raytheon Service Company; other facilities not determined

Owner—Delaware Solid Waste Authority

Procurement Approach—Processing facility and sludge handling, full service; steam generating facility, not determined

PRODUCTS/MARKETS:

Steam/Negotiating with industrial markets

Ferrous metals/Detinner

Aluminum/Recycler

Glass (froth floated)/Glass container manufacturers

Humus/Poultry farm for use as litter

PROJECT CONTACT: Pasquale Canzano
Chief Engineer
Delaware Solid Waste Authority
P.O. Box 981
Dover, Delaware 19901
(302) 678-5361

PROJECT STATUS: Processing plant and sludge handling subsystem, under construction; steam generating facility, advanced planning

This project is being partially funded by EPA as a demonstration facility. A contract was signed in August 1978 between the Delaware Solid Waste Authority and Raytheon Service Company for construction of the RDF processing plant and sludge handling subsystem. As of February 1979 site work was well under way, and an RFP was being developed for procurement of the steam generating facility.

The remainder of this report covers: Federal resource recovery facilities, resource recovery projects under the President's Urban Policy, and State resource conservation and recovery programs.

Federal Resource Recovery Facilities

Federal agencies, particularly the Department of Defense, are showing increasing interest in energy recovery from solid waste. Most of the Federal facilities use incineration, with steam being generated for on-site use. Some facilities are combining their operations with the solid waste programs of nearby cities.

Shown in table 5 are large- and small-scale, Federally-owned facilities that currently are operating, or under construction, or in advanced planning. In addition to the facilities shown, over 25 projects are under consideration for feasibility.

The information provided in the table was compiled in August 1978. For more information, contact Jane Stieber, State Programs and Resource Recovery Division (WH-563), Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C. 20460, telephone (202) 755-9140.

Resource Recovery Projects Under The President's Urban Policy

The President's Urban Policy, issued on March 27, 1978, directed the U.S. Environmental Protection Agency to carry out a program of financial assistance to urban areas for solid waste resource recovery. As stated in the *Federal Register*, October 17, 1978, this program is aimed at accomplishing three primary objectives: "to accelerate national progress in resource recovery implementation; to provide environmentally sound alternatives to solid waste disposal; and to assist economically distressed urban areas pursuant to the President's Urban Policy." To allow EPA to carry out this program, Congress approved funding of $15 million for FY 1979. An additional $13.9 million was requested by the President for FY 1980.

Funds offered by the program can be used by local governments to hire a resource recovery project director and staff, and to obtain consulting expertise and to pay other approved costs as listed in the *Federal Register* of October 17, 1978, pages 47944 through 47949. Final engineering design and construction are not fundable items under the program. Recipients of assistance are required to furnish 25 percent of the cost of their projects.

The deadline for submitting preapplications for FY 1979 funds was December 15, 1978. A total of 205 preapplications were received and evaluated by the States, the Department of Energy and the EPA headquarters and regional offices. Evaluation criteria included the extent of land disposal problems, potential for successful implementation of resource recovery, and degree of urban economic distress. On February 23, 1979, EPA announced that 68 communities had been selected to receive funds, pending the development of a satisfactory scope of work by the

TABLE 5. SUMMARY OF FEDERAL RESOURCE RECOVERY FACILITIES

Location	Federal Agency	Project Technology	Design Capacity (TPD)	Startup Date	Capital Costs	Status
ALABAMA						
Daleville	Army, Fort Rucker	Boilers fired with coal and RDF	Not determined	1981	$5M	Advanced planning; Army has approved funds
CONNECTICUT						
Newington	Veterans Administration Hospital	Package incinerator	1	October 1978	$0.17M	Under construction
FLORIDA						
Jacksonville	Naval Air Station	Package incinerator	40	Early 1979	$2M	Under construction
Mayport	Naval Station	Refractory furnace, waste heat recovery	50	Early 1979	$4M	Under construction
Key West	Naval Station	Solid waste composting	50 TPD, Phase I of three phases	July 1979	$1.69M (Navy's share, $1.472M)	Under construction; joint project with city
St. Petersburg	Bay Pines V.A. Hospital	Waterwall furnace	3.5	February 1982	$0.3M	Advanced planning
INDIANA						
Marion	V.A. Hospital	Waste heat recovery	3	October 1979	$220,000	Under construction
NEW YORK						
Buffalo	V.A. Hospital	Package incinerator	4	Late 1980	$0.2M	Advanced planning
OHIO						
Dayton	Wright Patterson AFB	Boilers co-fired with coal and RDF	30 TPD of RDF	April 1979	$37M	Under construction
VIRGINIA						
Arlington	Pentagon, Army	Consumat incinerator	25	February 1977	—	Operating
Arlington	Pentagon, Army	Pulp Plant	10	1977	—	Operating
Hampton	NASA, Air Force	Waterwall furnace	200	June 1980	$10M	Under construction
Norfolk	Naval Station	Waterwall furnace	360	1967	$4.22M	Operating
Portsmouth	Naval Ship Yard	Waterwall furnace	160	1976	$3.5M	Operating
Warwick	Army, Fort Eustis	Package incinerator	32	July 1979	$1.5M	Advanced planning

communities. The selected projects included seven for source separation, four for sewage sludge co-disposal with solid waste, and a variety of large-scale and small-scale energy recovery projects. The selectees for FY 1979 are listed in table 6 by EPA Regions. For further information on the Resource Recovery Program under the President's Urban Policy, contract Steven Levy, State Programs and Resource Recovery Division (WH–563), Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C. 20460, telephone (202) 755-9140.

State Resource Conservation and Recovery Programs

As open dumps are being closed and upgraded, and as land disposal sites are becoming increasingly difficult to locate and more stringently regulated, resource conservation and recovery is surfacing as a key alternative for solid waste management in the United States.

The Congress has urged the States to exercise leadership in facilitating the movement toward more environmentally sound disposal. Several sections of the Resource Conservation and Recovery Act of 1976 (RCRA) stress the importance of developing State resource conservation and recovery programs. A key mechanism for planning and implementing these programs is the State Solid Waste Management Plans. On August 28, 1978, EPA issued proposed guidelines for the development and implementation of State plans for solid waste management. Subpart D of these guidelines delineates the required and recommended resource conservation and recovery activities which are to be incorporated in the State plans.

In addition to the Guidelines, EPA's Office of Solid Waste is drafting a handbook tentatively titled, *Developing A State Resource Conservation and Recovery Program*. The handbook will delineate the opportunities available to States, and will utilize examples of States which have seized those opportunities to their advantage.

The table on the following pages (table 7) presents a picture of the current level of State resource conservation and recovery activity in the United States. The data was collected by telephone interviews conducted over the 12-month period, January-December 1978. The specific date of collection for each State is shown in the first column of the tables. Each State's activities are broken down into three categories of activities: planning, legislation, and implementation. More detailed information about these activities is available in an EPA publication titled *State Resource Recovery Activities, 1978*.

If you have any questions about these State activities or would like to provide EPA with updated information, please contact David Gavrich, State Programs and Resource Recovery Division (WH–563), Office of Solid Waste, EPA, Washington, D.C. 20460, telephone (202)755-9140.

TABLE 6. RESOURCE RECOVERY PROJECTS UNDER THE PRESIDENT'S URBAN POLICY, 1979 SELECTEES

EPA REGION 1

Connecticut Resource Recovery Authority (New Haven), CT
New Britain, CT

Central Massachusetts Solid Waste Project (Worcester), MA
Lower Pioneer Valley—Regional Resource Recovery Planning Project (Springfield), MA

Claremont, NH
Dover and Somersworth, NH

Rhode Island Solid Waste Management Corporation, RI

Rutland, VT

EPA REGION 2

Camden City and County, NJ
Hackensack Meadowlands Commission, NJ
Mercer County Improvement Authority (Trenton), NJ
Newark, NJ

Brookhaven, NY
Monroe County, NY
New York City, NY
Port Authority of New York and New Jersey (New York City), NY
Utica, NY
Westchester County, NY

Solid Waste Management Authority (San Juan), PR

Government of the Virgin Islands—Department of Public Works (St. Thomas), VI

EPA REGION 3

District of Columbia Department of Environmental Services, DC

Baltimore County, MD
Howard County (Columbia), MD

Philadelphia, PA

Southeast Public Service Authority (Norfolk), VA

State Resource Recovery—Solid Waste Disposal Authority, WV

EPA REGION 4

Jefferson County (Birmingham), AL

Broward County, FL
Daytona Beach, FL
Escambia County (Pensacola), FL
Hillsborough County (Tampa), FL

(Continued) TABLE 6

Floyd County (Rome), GA
LaGrange, GA
Savannah, GA

Bell County (Middlesboro), KY

Hattiesburg, MS

Charlotte, NC
Fayetteville, NC

EPA REGION 5

Chicago, IL
Rockford, IL

Indianapolis, IN

Detroit, MI
Flint, MI
West Michigan Regional Planning Commission (Grand Rapids, Muskegon), MI

St. Paul, MN

Cuyahoga County (Cleveland), OH
Montgomery County (Dayton), OH
Toledo, OH

State Solid Waste Recycling Authority (Wausau), WI

EPA REGION 6

New Orleans, LA

Del City, OK

Tarrant County (Fort Worth), TX
Waco, TX

EPA REGION 7

Black Hawk County, IA

Bi-State Development Agency (St. Louis), MO
Kansas City, MO
Springfield, MO

EPA REGION 8

Eagle, CO

Wasatch Front Regional Council (Salt Lake City), UT

TABLE 6 (Concluded)

EPA REGION 9

Berkeley, CA
Long Beach, CA
Los Angeles, CA
Los Angeles County, CA
San Francisco, CA

Kauai County, HA

EPA REGION 10

Lane County, OR
Portland, OR

King County (Seattle), WA

TABLE 7. SUMMARY OF STATE RESOURCE RECOVERY ACTIVITIES

State	Agency	Planning	Legislation	Implementation
Alabama (contacted, 07/78)	State Department of Public Health	No significant activity	Beverage container legislation (bev. cont. legis.) and litter bills introduced	No significant activity
Alaska (02/78)	Dept. of Environmental Conservation	No significant activity	Bev. cont. legis. pending	No significant activity
Arizona (03/78)	Dept. of Health Services	No significant activity	Bev. cont. legislation introduced; little chance due to Beverage Industry Recycling Program (BIRP) Waste oil recycling bill introduced	Office paper separation pilot program
Arkansas (07/78)	Dept. of Energy and Environmental Policy Dept. of Pollution Control and Ecology	Feasibility studies of energy recovery from solid wastes Resource Recovery Planning Section opened in DPCE	Litter bill passed 1977 Bev. cont. legis. introduced	Several small-scale energy recovery systems operating
California (03/78)	State Solid Waste Management Board	Local feasibility and market studies under way, six are State-funded State Resource Recovery Plan being updated Educational packages on waste reduction developed	Tax on litter-producing businesses Oil Recycling Bill; passed, 01/78 Bill passed providing 5% cost preference for recycled paper in State procurement	Statewide Office Building Paper Separation Project State Park Recycling Project (one park)
Colorado (10/78)	State Dept. of Health	Legislation for RCRA compliance under study	Bev. cont. legis. recently defeated	Telephone book recycling in Denver Paper recycling at Defense Department installations
Connecticut (01/78)	Connecticut Resource Recovery Authority	"Requests for Approaches" sent for second major resource recovery (RR) facility; construction to begin December 1978	CRRA established; given bonding authority	Construction 30% complete on CRRA first RDF facility

Delaware (04/78)	Delaware Solid Waste Authority	Planning for State-owned co-disposal plant at Wilmington; market studies	Established DSWA, 1974. Comprehensive authority over solid waste	Wilmington project in design stage
District of Columbia (04/78)	Dept. of Environmental Sciences	Talks with utility about use of RDF Participating in National Center for Resource Recovery pilot project	Passed mandatory deposit, contingent upon suburban legislation	No significant activity
Florida (07/78)	Dept. of Environmental Regulation Resource Recovery Council	21-county survey of solid waste legal authority Statewide energy recovery feasibility study	RR Bill of 1978 offers appropriations to counties and tax incentives for RR. Out of committee	RRC publishes information on technology and State activities
Georgia (07/78)	Dept. of Natural Resources Environmental Protection Division	Regional resource recovery feasibility studies Study of recycling waste oil from State vehicles	Act establishing local Resource Recovery Authorities with bonding and contracting power	State Office Paper Separation Program DNR to purchase only recycled paper State-funded source separation project
Guam (05/78)	None	No significant activity	Bev. cont. legis. proposed	No significant activity
Hawaii (05/78)	Dept. of Health	State-funded feasibility and bonding studies for refuse-to-energy project	Proposed law encouraging State procurement of recycled materials drafted	Site acquired for one-county refuse-to-energy project
Idaho (02/78)	Dept of Health and Welfare	Some investigation of secondary materials markets	Bev. cont. legis. introduced	Some technical assistance
Illinois (09/78)	Illinois Environmental Protection Agency	Feasibility study for $4.2M (State grant) RDF demo plant proved negative	No significant activity	No State projects; Chicago has two RR facilities

TABLE 7 (Cont.)

TABLE 7. SUMMARY OF STATE RESOURCE RECOVERY ACTIVITIES

State	Agency	Planning	Legislation	Implementation
Indiana (09/78)	Indiana State Board of Health	Assisting in communications network for marketing recovered materials from source separation	Amendment on ownership of local waste stream to be introduced	Active program of lectures on solid waste legislation Developing paper recycling for State Board of Health
Iowa (05/78)	Dept. of Environmental Quality	Monitoring planning in other parts of State Researching wastes for recovery	Bev. cont. legis. introduced	State-sponsored oil recycling project Encouraged industrial waste exchange at Iowa State University
Kansas (05/78)	Dept. of Health and Environment	Encouraging resource recovery planning Maintaining Statewide survey of secondary materials purchasers	Legislation defining ownership of solid waste passed Bev. cont. and litter bills introduced	Waste oil program in capital Encouraging purchase of recycled materials
Kentucky (07/78)	Dept. of Natural Resources and Environmental Protection	No significant activity	Litter bill passed House Bill to enable State cooperation in funding resource recovery	No significant activity
Louisiana (07/78	Office of Science, Technololgy and Environmental Planning	Preliminary planning for 3600 TPD energy and materials recovery plant	Little progress	NCRR operating Resource Recovery I at New Orleans Kaiser Aluminum operating aluminum recovery project
Maine (01/78)	None	Updating State Solid Waste Plan	Bev. cont. deposit law passed November 1976	No significant activity
Maryland (04/78)	Maryland Environmental Service	Feasibility study for proposed project State assistance in preparing county plans	Requires 25% of State paper purchases to be recycled material by 1981, and 45% by 1985	State participation in two operating plants State Office Paper Separation Program

Massachusetts (01/78)	State Bureau of Solid Waste Disposal	State Bureau directing regional RR projects in four metro areas: one close to construction, three into planning	State Bureau supporting renewed effort for bev. cont. bill	No significant activity
Michigan (09/78)	Michigan Dept. of Natural Resources	Feasibility study in progress for entire State Market study completed Providing technical assistance to several communities	Bev. cont. legis. passed, 1976 Bill passed 1974 to conserve resources and regulate RR projects Legislation passed to facilitate cities' role in RR projects	State technical assistance given to planning 3000 TPD plant in Detroit
Minnesota (09/78)	Minnesota Pollution Control Agency	Several RR facilities are developing Drafting market survey Grant program disbursed $1.2M for feasibility studies	Pop-top cans banned by State law Packaging legislation bans certain types of packaging Waste Oil Bill, passed January 1976	Abandoned motor vehicle program
Mississippi (07/78)	State Board of Health	No significant activity	Bonding authorization for RR facilities pending	Some plant activity without State involvement
Missouri (05/78)	Dept. of Natural Resources	Participating in numerous feasibility studies DNR completed market survey	Some legislation pending	DNR sponsoring paper recycling programs
Montana (10/78)	Dept. of Health and Environmental Sciences	State funds solid waste studies, requiring consideration of resource recovery	No significant activity	Abandoned auto program One local curbside newspaper collection
Nebraska (05/78)	Dept. of Environmental Control	Assisting RR planning in two cities Completing market survey for secondary materials	Litter law pending	Sludge composting project Supports "Keeping Omaha Beautiful Recycling Program"

TABLE 7 (Cont.)

TABLE 7. SUMMARY OF STATE RESOURCE RECOVERY ACTIVITIES

State	Agency	Planning	Legislation	Implementation
Nevada (05/78)	Dept. of Conservation and Natural Resources	No significant activity	Bev. cont. law pending	No significant activity
New Hampshire (01/78)	State Dept. of Energy	No significant activity	No significant activity	State demo projects on sludge composting, rural recycling, and regional planning
New Jersey (05/78)	Dept. of Environmental Protection Dept. of Energy	Some technical assistance given to Newark and counties	*Solid Waste Mgmt. Act*, 1975, requires max. feasible RR	No significant activity
New Mexico (07/78)	Environmental Improvement Agency	Planning beverage container recovery, waste oil recycling, sludge farming, tire recycling	Little activity	Source separation active in three cities Some experimentation with paper recycling
New York (05/78)	Dept. of Environmental Conservation	State assistance (technical and financial) for planning RR facilities in cities and counties Extensive market surveys for recovered materials *State Comprehensive Resources Recovery and Solid Waste Mgmt. Plan*, draft, February 1978 State source separation grant program	Resource Recovery Act, 1977, encourages resource recovery Legislation passed, 1972, providing $175 million for construction of RR facilities	Assistance given to several operating RR facilities
North Carolina (07/78)	Dept. of Human Resources; Division of Health Services	No significant activity	Legislation allowing certification of RR facilities	No facilities constructed; 40 certifications issued
North Dakota (10/78)	State Dept. of Health	Limited technical assistance provided	None	Successful Statewide abandoned auto program

Ohio (09/78)	Ohio Environmental Protection Agency	Continuing work on State Plan Technical assistance, and funding to several projects	Bill passed, 1977, allowing contracts without competitive bidding for RR projects	Akron facility under construction, some State funds
Oklahoma (07/78)	Oklahoma Dept. of Health	Conducting market survey for recovered materials Tulsa planning RDF plant	None	Successful source separation program at Fort Sill
Oregon (02/78)	Dept. of Environmental Quality	Source separation and resource recovery identified as key State priorities	Mandatory deposit on carbonated beverage containers, 1972	Grant/loan program set up for implementing regional and local solid waste management plans Statewide Recycling Information Office set up
Pennsylvania (04/78)	Dept. of Environmental Resources	Conducted five metro area market studies Grants made available to locals for feasibility studies and implementation	No significant activity	No significant activity
Puerto Rico (05/78)	Environmental Quality Board	Resource Recovery and Source Separation Task Forces set up	No significant activity	No significant activity
Rhode Island (01/78)	Rhode Island Solid Waste Management Corporation	RISWM Corp. receiving proposals for RR facility at Providence	RISWM Corp. given bonding authority	Providing technical assistance on recycling to communities
South Carolina	Dept. of Health and Environmental Control	DHEC administering RR grant program	Beverage container and litter control legislation pending	No significant activity
South Dakota (10/78)	Dept. of Environmental Protection	No significant activity	Bev. cont. legis. passed	Limited activity
Tennessee (07/78)	Dept. of Public Health	No significant activity	*Resource Recovery Loan Law*, passed, 1974	No significant activity

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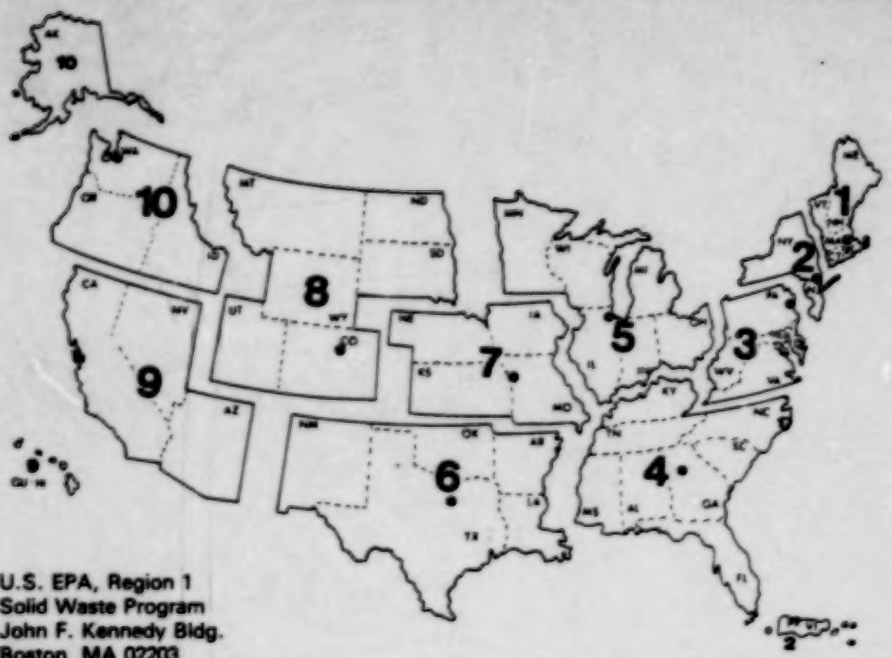
TABLE 7 (Concluded)

TABLE 7. SUMMARY OF STATE RESOURCE RECOVERY ACTIVITIES

State	Agency	Planning	Legislation	Implementation
Texas (07/78)	Texas Dept. of Health	Making overall study of RR to find most effective large-scale implementation method Inventories of large-city waste streams being taken	Law requires State agencies to recycle office paper	Testing and small-scale activity Some newspaper recovery in larger cities
Utah (10/78)	Utah Division of Health	No significant activity	No significant activity	No significant activity
Vermont (01/78)	None	No significant activity	Bev. cont. legis. passed, September 1973	State initiated waste oil recycling program
Virgin Islands (05/78)	Dept. of Public Works	Feasibility study for energy recovery in St. Thomas	No significant activity	No significant activity
Virginia (04/78)	Dept. of Health	Grant program for all solid waste activities	No significant activity	No significant activity
Washington (02/78)	Dept. of Ecology	Developed marketing plan for recovered materials Updating Resource Recovery Plan	Litter law levies charge on manufacturing of potential litter	Statewide Recycling Hotline Grant Program for solid waste plans
West Virginia (04/78)	State Solid Waste Authority	No significant activity	Establishment of SSWA, 1977	No significant activity
Wisconsin (09/78)	Wisconsin Dept. of Natural Resources Wisconsin Solid Waste Recycling Authority	WSWRA contributing $10M to construction of 3-county RDF plant Market survey completed, 1973	1974 creation of WSWRA to develop, finance and implement RR facilities	WDNR suggested changes in Americology's Milwaukee plan Scattered recycling of waste oil, office paper and newspaper
Wyoming (10/78)	Wyoming Dept. of Environmental Quality	No significant activity	No significant activity	Government office paper recycling program

EPA REGIONS



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